

# 2003

TECHNICAL SEMINAR



# *Automatic Transmission Rebuilders Association*

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## 2003 TECHNICAL SEMINAR

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# *ATRA Technical Team*



Dennis Madden  
Chief Executive Officer



Lance Wiggins  
Technical Director

## Creating a Great Seminar...

For most of you, a technical seminar is maybe half-a-dozen or so hours of intense technical information... and then, as quickly as it begins, it's over. But a lot of effort goes in ahead of time, researching, developing and designing a seminar, long before it's ready to play your town. Long days... late hours... frayed nerves... all part of the process to put a clean, carefully-choreographed presentation in front of a discriminating audience.

The folks involved in developing this year's seminar are the leaders in the transmission repair industry. With over 200 years of combined technical experience, they've poured their heart and soul into every page and slide in this program. Whether their contribution involved technical expertise or organizational skills, the culmination of their efforts was an extraordinary educational experience that we're proud to call the ATRA 2003 Technical Seminar.

We hope your experience is as rewarding as it was for us to develop it.



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## *ATRA Staff*

It's difficult enough getting the seminar book researched, written, pictured, edited, and printed let alone getting it out to the seminar attendees. This is where the ATRA Staff comes in.

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Without the ATRA team, it would be very hard to accomplish the task at hand. Please enjoy the seminar.

Lance Wiggins  
ATRA, Technical Director



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## *Service 4wd Light On, Possible DTC B2725 set*

A complaint of the “Service 4WD” light is on in the instrument cluster or the transfer case “shifts by itself”.

Once the DTC is set, the transfer case will not shift into 4WD. This condition may effect 1999-2003 Full size GM trucks and sport utility vehicles such as Silverado, Tahoe, Escalade, Yukon, Yukon XL, Avalanche and Suburban applications with the NV 246 transfer case (RPO NP8) and/or the 2002/2003 Trail Blazer/Envoy with the NV236 transfer case. In addition complaints of incorrect reading in the transfer case switch assembly is illuminated.

**NOTE: Your scan tool must be capable of communicating with the vehicle body computer/TCCM (Transfer Case Control Module) in order for you to read the codes, as these are not PCM related DTC’s.**

DTC B2725 will set if:

The TCCM detects low voltage (Less than 1 volt) on the transfer case range switch circuit for longer than 5 minutes.

If B2725 is set the TCCM will:

- Â Inhibit 4WD
- Â Illuminate the 4WD light



# *Service 4wd Light On, Possible DTC B2725 set*

Possible causes for this code can be:

- ⌘ A faulty transfer case control switch (which is mounted in the dash)
- ⌘ A short to ground in the wiring between the control switch assembly mounted in the dash and the TCCM
- ⌘ A faulty TCCM
- ⌘ TCCM Reprogm updat for 2003

**NOTE:** When following the service manual diagnostic procedure, you may be lead to replace components that are not faulty. The switch resistance values listed in the service manual maybe incorrect.

The correct control switch resistance values are as follows:



**Measure Resistance  
between Pin 1 and Pin 2**

|                           |                           |
|---------------------------|---------------------------|
| <b>No buttons pushed:</b> | <b>8.63-9.54 ohms</b>     |
| <b>Auto 4wd:</b>          | <b>61.7-68.1 ohms</b>     |
| <b>4 HI:</b>              | <b>656-670 ohms</b>       |
| <b>2 HI:</b>              | <b>1.5-1.53 K ohms</b>    |
| <b>4 LOW:</b>             | <b>2.32-2.37 K ohms</b>   |
| <b>Neutral:</b>           | <b>1.015-1.035 K ohms</b> |



## *All GM*

### *B1001, B1271, B1780*

1996 and later controller replacement and reprogramming is becoming an increasingly common service procedure for most shops. Several DTCs may be set when programming or replacing a controller including B1001, B1271 and B1780.

All GM vehicles utilize either a Class 2 or CAN data bus. Serial Data communications constantly occur between the different controllers on your GM vehicle. The modules that are common to most applications are:

- ⌘ PCM (Powertrain control module)
- ⌘ BCM (Body control module)
- ⌘ DIM (Dash integration module)
- ⌘ IPC (Instrument panel cluster)
- ⌘ HVAC (Heating, ventilation, A/C module)
- ⌘ SDM (Sensing and deployment module) Airbag

If a B1001 (SDM configuration error) sets, deployment of the air bags will be inhibited. If a B1271 or a B1780 (Radio theft lock) DTCs are set the radio will no longer work. These DTC's will turn on the AIRBAG lamp. In addition, the radio will display "LOCKED" after your repair.

The most common cause of this problem happens when attempting to interchange a module from another vehicle. This can result in not only the DTCs described above setting, but also a possible no start condition. Another cause is the wrong VIN loaded into the NEW PCM or BCM. Both the PCM and the BCM require programming before they will function.

**REPAIR:** Several steps should be taken if these DTCs are set including:

1. Make sure the correct part number controllers were used for your application.
2. Make sure the correct VIN was loaded into the replacement controller
3. After the controller was installed, turn the key off for at least 30 seconds
4. Turn the ignition ON and check for the DTCs. If DTCs B1001 and/or B1271 and/or B1271 are set as "HISTORY" codes do not replace the SDM or the RADIO. Simply Clear all the stored DTCs.
5. Cycle the key off, then on and monitor the Airbag lamp in the dash. It should flash 7-9 times and then go off.

**NOTE:** Clearing the DTCs as described above is a common part of the replacement and reprogramming procedure on all GM applications.

## *4T40E/45E N-Car*

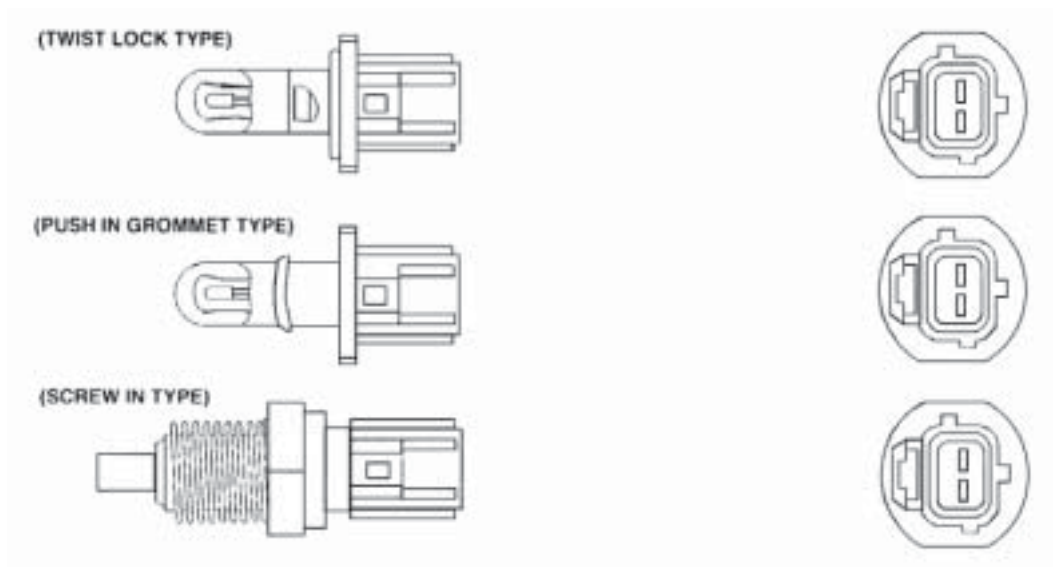
### *Hard Shifts/ No DTC'S*

4T40E/45E applications may exhibit a hard shift concern that may/may not be intermittent. In some instances an IAT (intake air temperature sensor) DTC may be set. The PCS commanded/actual amperages will indicate low amperage flow through the PCS and its circuits. In addition the technician may indicate that he/she had problems controlling the PCS amperage when using the PCS override feature on their scan tool.

Several of the 4T40E/45E applications utilize the IAT sensor as part of the engine torque calculations. Torque modeling is used by the PCM to determine the line pressure calculation.

The most common causes of this concern are:

- Â Broken wiring, generally the wire is damaged at the sensor connector
- Â Terminal pin tension, terminal crimp damaged
- Â A faulty IAT sensor



# 4T40E

## *Saturn Application*

### *Possible P0731 DTC set*

Saturn applications use individual DTCs to identify which gear the transaxle was in at the time a ratio error occurred. P0731 sets if a ratio error occurs in 1<sup>st</sup> gear while P0732 will set if a ratio error is present in 2<sup>nd</sup>, P0733 in 3<sup>rd</sup> and P0734 will set in 4<sup>th</sup>.

If a P0731 is set along with any or all of the following DTCs, address the other DTCs first. Other DTCs which may effect diagnosis include:

- Â P0716 (Turbine speed electrical interference/noise)
- Â P0717 (No turbine signal)
- Â P0745 (Low line pressure)
- Â P0722 (No VSS signal).

If only a P0731 is set, review the stored data relating to the DTC and note which shifter position the transaxle was in and the VSS values. If the DTC was set in park and the VSS data indicates a VSS reading (usually around 15-35mph) the cause of the problem is typically a poor ITCM (Internal Transmission Control Module) ground (G115 on the back of the engine).

## ***4T40/45E N-Car***

### ***VSS Intermittent or Possible DTC P0502***

Erratic speedometer operation, No/Erratic/Intermittent transmission shifts, intermittent cruise control operation. Possible DTC P0502 may be set. This problem is most common on the N-body (Grand AM, Alero) applications with the 2.2L L61 engine and J41 brakes.

A common cause for this is the VSS harness being too long in the area of the right hand (passenger side) axle shaft area. The extra harness length allows the harness (circuit 400 and 401) to contact the axle shaft leading to harness chaffing and the intermittent complaint.

Reposition the conduit for the wiring leg to allow clearance at the top of the engine rather than at the axle area. Secure the harness in the mounting clip.



**VSS harness  
the right hand  
(passenger side)  
axle shaft area.**

## ***4T40E/4T45E***

### ***Driveability Concerns N-Car 2.2L/ 3.4L***

Pontiac Grand AM/Oldsmobile Alero applications with the 2.2L or 3.4L engine and the 4T40E or 4T45E transmission may experience any of the following concerns in any combination:

- Â No start
- Â Drivability conditions (engine miss, etc.)
- Â MIL on
- Â Possible DTCs
- Â Cooling Fan inoperative
- Â ABS inoperative
- Â Any of the above concerns can be intermittent in nature

A common cause for these concerns are Ground G-103 being loose or corroded. Remove the ground from the bell housing. Clean and reinstall the ground. You may want to install a star washer to assure proper ground continuity. The ground strap is located on the right upper bell housing bolt on the drivers side.



**Located on  
the upper right  
hand side of the  
bell housing.**

## ***4T40E/45E***

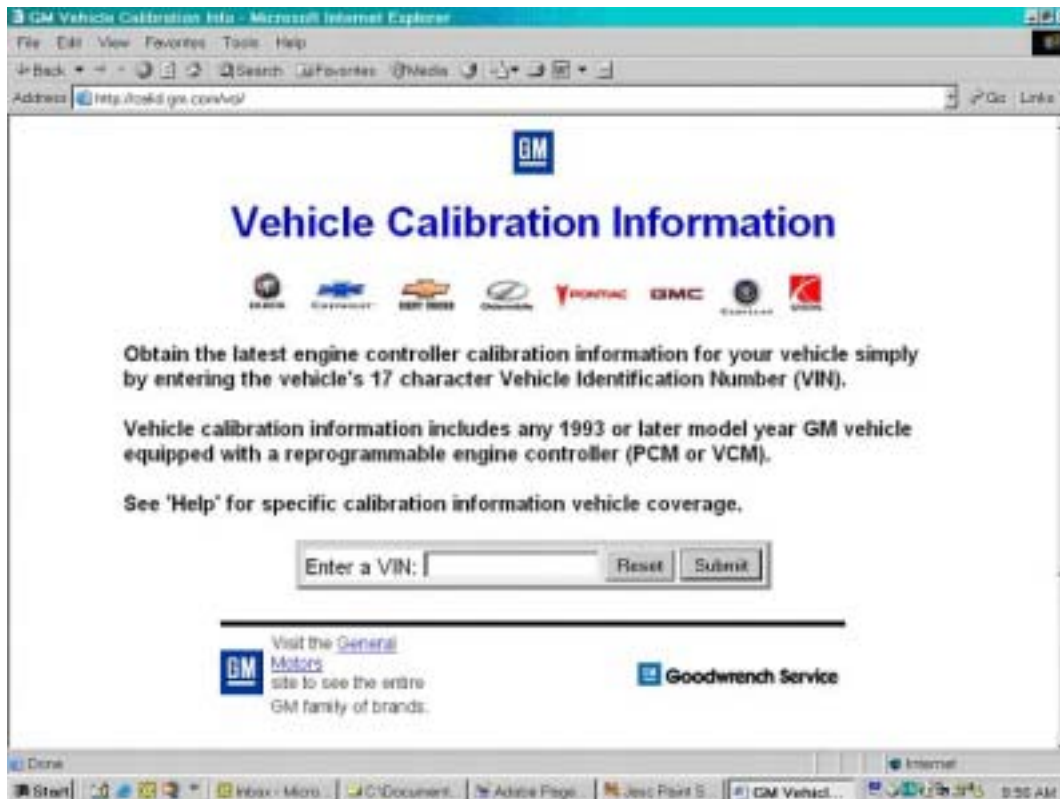
### ***P0741 Set N-Car 3.1L (RPO LG8)***

1995-2002 Chevrolet Malibu “N” body, may have the SES light is on and P0741 (TCC stuck off) DTC set in memory. On 1995-2001 applications this condition may not have occurred until the PCM was recalibrated for some other concern.

The calibration loaded in the 2002 Malibu and any calibration updates that were done on early model Malibu applications during the 2002 model year may have a software problem. The 2002 calibration tables allowed the P0741 to falsely set.

An updated 2003 calibration is now available to repair this concern. Visit the GM web site to see if your vehicle requires recalibration.

**<http://calid.gm.com/vci/>**



## *4T40E/45E*

### *P1815 Set N-Car*

Code P1815 may also be set in conjunction with other PSA DTCs such as a P1810. In many instances the PSA has already been replaced for this condition. If the P1815 is set in conjunction with other PSA DTCs the problem is probably caused by metal contamination. This can be from the manufacture or possibly from the transmission itself. If the P1815 is set with no other DTCs it may be a false code.

P1815 will set if:

- ⌘ D2, D4 or reverse range is indicated at start up
- ⌘ The condition lasts for longer than 25 seconds

P1810 will set if:

- ⌘ The PCM detects an invalid gear range
- ⌘ The condition lasts for longer than 60 seconds

If the problem is related to contamination replace the PSA. Updated procedures are now being followed by the vendor to prevent contamination. If the P1815 is set but there are no other codes, update the PCM with the calibration designed to prevent a false P1815 from setting. Visit the GM web site to obtain the correct calibration for your application. [\*\*http://calid.gm.com/vci/\*\*](http://calid.gm.com/vci/)

# 4T60E

## *Ratio and Application Chart*

The 4T60E utilizes several different final drive, drive/driven sprocket, speed sensor and torque converter combinations. Installing the wrong transmission, drive/driven sprockets, final drive, speed sensor or torque converter can result in ratio error or slip DTC's . If a ratio error or a TCC slip DTC is present, and the unit has been previously repaired or replaced, the converter, final drive ratio, speed sensor and/or drive to driven sprocket ratio could possibly be incorrect for your application. Refer to our chart to determine what transmission should be used for your application. As with other GM vehicles the engine, transmission and final drive ratio information for your specific vehicle model is located on the regular production option label (RPO). The RPO label should be used exclusively to determine which transmission fits in which vehicle body style and application

| RPO Codes for the 4T60E Applications |                  |     |                    |
|--------------------------------------|------------------|-----|--------------------|
| RPO                                  | Definition       | RPO | Definition         |
| L82                                  | 3.1L Engine      | L26 | 4.9L Engine        |
| L67                                  | 3800 Engine      | L27 | 3800 Engine        |
| LQ1                                  | 3.4L DOHC Engine | LHO | 3.1L Engine        |
| L40                                  | 2.31 DOHC Engine | LD2 | 2.3L Engine        |
| L36                                  | 3800 Engine      | L67 | 3800 Super Charged |
| L27                                  | 3800 Engine      |     |                    |
| LN2                                  | 2.2L Engine      | LD9 | 2.4L Engine        |
| FX8                                  | 3.61 Ratio       | LA1 | 3.4L Engine        |
| F17                                  | 2.84 Ratio       | F68 | 3.45L Ratio        |
| M13                                  | 4T60E            | FVO | 3.67 Ratio         |
| FW2                                  | 3.06 Ratio       | MXO | 4 Speed            |
| F13                                  | 3.48 Ratio       | FRQ | 3.29 Ratio         |
| F79                                  | 2.97 Ratio       | F16 | 2.53 Ratio         |
| F83                                  | 3.05 Ratio       | FW9 | 3.43 Ratio         |
| FR9                                  | 3.29 Ratio       | F16 | 2.53 Ratio         |

# 4T60E

## Ratio and Application Chart

| Application                       | Year      | Model Codes               | Drive/Driven Sprockets | Final Drive SRTA Part # | Speed Sensor Teeth | SRTA Part # |
|-----------------------------------|-----------|---------------------------|------------------------|-------------------------|--------------------|-------------|
| Cad E/K<br>Body<br>4.9<br>L28     | 1991      | 1A2W<br>1AM<br>1A2        | 37/33                  | 3.33                    | 30                 | 8686931     |
| Cad C/K<br>Body<br>4.9L<br>L26    | 1991      | 1A4W<br>1AP<br>1A4        | 37/33                  | 3.33                    | 30                 | 8686932     |
| Cad E/K<br>Touring<br>4.9L<br>L26 | 1991      | 1A7W<br>1AY<br>1A7        | 37/33                  | 3.33                    | 30                 | 8686933     |
| BUICK E<br>BODY<br>3800           | 1991      | 1YPW<br>1YP               | 35/35                  |                         |                    | 8651955     |
| C-BODY                            | 1991/1992 | 2B1W<br>1BT<br>2BT<br>2B1 | 37/33                  | 3.33                    | 31                 | 8686916     |
| C/H BODY<br>TOUR                  | 1992      | 2C1W<br>2CL<br>2C1        | 35/35                  | 2.84                    | 30                 | 8686918     |
| C/H BODY<br>TOUR                  | 1992      | 2C2W<br>2CS<br>2C2        | 35/35                  | 3.06                    | 30                 | 8686919     |
| C/H<br>BODY                       | 1992      | 2C3W<br>2CT<br>2C3        | 35/35                  | 3.06                    | 31                 | 8686920     |
| W BODY<br>3.4L                    | 1991/1992 | 1CW<br>2C4W<br>2CW<br>2C4 | 33/37                  | 3.06                    | 30                 | 8686921     |
| C BODY<br>3800<br>TOUR            | 1992      | 2C5W<br>2CX<br>2C5        | 37/33                  | 3.33                    | 31                 | 8686922     |
| H BODY<br>SSE,SSEI<br>TOUR        | 1992      | 2C6W<br>2CZ<br>2C6        | 37/33                  | 3.33                    | 31                 | 8686923     |
| H BODY<br>SSE                     | 1992      | 2P1W<br>2PH<br>2P1        | 37/33                  | 3.33                    | 31                 | 8686924     |

# 4T60E

## Ratio and Application Chart

| Application             | Year      | Model Codes                             | Drive/Drive-n Sprockets | Final Drive SRTA Part # | Speed Sensor Teeth | SRTA Part # |
|-------------------------|-----------|-----------------------------------------|-------------------------|-------------------------|--------------------|-------------|
| C/H/W BODY 3800         | 1992      | 2W1W<br>2WA<br>2W1                      | 35/35                   | 3.06                    | 31                 | 8686925     |
| C/H BODY 3800           | 1992      | 2YLW<br>2YL<br>2Y1                      | 35/35                   | 2.84                    | 31                 | 8682926     |
| C/H BODY 3800           | 1991/1992 | 2Y2W<br>2YM<br>2Y2<br>1YM               | 35/35                   | 2.84                    | 30                 | 8686927     |
| C/H BODY 3800           | 1991/1992 | 1YZ<br>2YZ<br>2Y4<br>2Y4W               | 35/35                   | 3.06                    | 30                 | 8686929     |
| H BODY SSE              | 1992      | 2B2W<br>2BY<br>2B2                      | 35/35                   | 3.06                    | 31                 | 8686917     |
| CAD E/K TOUR L26        | 1992      | 2A7W<br>2AY                             | 37/33                   | 3.33                    | 31                 | 8686913     |
| CAD C BODY TOUR L26     | 1992-1993 | 2AB<br>2A1<br>3ABW<br>3AB               | 37/33                   | 3.06                    | 30                 | 8651986     |
| CAD E/K L26             | 1992/1993 | 2AM<br>2A2<br>3AMW<br>3AM               | 37/33                   | 3.33                    | 31                 | 8651987     |
| CAD C BODY TOUR L26     | 1992/1993 | 2AN<br>2A3<br>3AN<br>3ANW               | 37/33                   | 3.33                    | 30                 | 8651988     |
| CAD E/K BODY EXPORT L26 | 1992/1993 | 2AP<br>2A4<br>3AP<br>3APW               | 37/33                   | 3.33                    | 31                 | 8651989     |
| CAD C BODY L26          | 1991-1993 | 1AH<br>1AV<br>2AV<br>2A5<br>3AV<br>3AVW | 37/33                   | 3.06                    | 30                 | 8651990     |

# 4T60E

## Ratio and Application Chart

| Application                   | Year      | Model Codes                      | Drive/Drive-n Sprockets | Final Drive SRTA Part # | Speed Sensor Teeth | SRTA Part # |
|-------------------------------|-----------|----------------------------------|-------------------------|-------------------------|--------------------|-------------|
| CAD C BODY TOUR EXPORT L26    | 1992/1993 | 2AW<br>2A6<br>3AW<br>3AWW        | 37/33                   | 3.33                    | 30                 | 8651991     |
| CAD C BODY LIMO L26           | 1991-1993 | 1AZ<br>2AZ<br>2A8<br>3AZ<br>3AZW | 37/33                   | 3.06                    | 32                 | 8651992     |
| C BODY 3800 L67               | 1993      | 3BTW<br>3BT                      | 37/33                   | 3.33                    | 31                 | 8651993     |
| H BODY 3800 L27               | 1993      | 3BY<br>3BYW                      | 35/35                   | 3.06                    | 31                 | 8651994     |
| C/H BODY TOUR 3800 L27        | 1993      | 3CL<br>3CLW                      | 35/35                   | 2.84                    | 30                 | 8651995     |
| C/H BODY TOUR EXPORT 3800 L27 | 1993      | 3CS<br>3CSW                      | 35/35                   | 3.33                    | 30                 | 8651996     |
| H BODY SSE 3800 L27           | 1993      | 3CT<br>3CTW                      | 35/35                   | 3.06                    | 31                 | 8651997     |
| C BODY TOUR 3800 L67          | 1993      | 3CX<br>3CXW                      | 37/33                   | 3.06                    | 31                 | 8651998     |
| H BODY SSE SSEI TOUR 3800 L67 | 1993      | 3CZ<br>3CZW                      | 37/33                   | 3.33                    | 31                 | 8651999     |

# 4T60E

## Ratio and Application Chart

| Application                          | Year | Model Codes | Drive/Driven Sprockets | Final Drive SRTA Part # | Speed Sensor Teeth | SRTA Part # |
|--------------------------------------|------|-------------|------------------------|-------------------------|--------------------|-------------|
| H BODY<br>SSE<br>TOUR<br>3800<br>L67 | 1993 | 3PH<br>3PHW | 37/33                  | 3.33                    | 31                 | 8686900     |
| C/H/W<br>BODY<br>3800<br>L27         | 1993 | 3WA<br>3WAW | 35/35                  | 3.06                    | 31                 | 8686901     |
| C/H<br>BODY<br>3800<br>L27           | 1993 | 3YM<br>3YMW | 35/35                  | 2.84                    | 30                 | 8686902     |
| C/H BODY<br>EXPORT<br>3800<br>L27    | 1993 | 3YZ<br>3YZW | 35/35                  | 3.06                    | 30                 | 8686903     |
| W BODY<br>3.4L<br>LQ1                | 1993 | 3CW<br>3CWW | 33/37                  | 3.06                    | 30                 | 8686904     |
| W BODY<br>3.1L<br>LHO                | 1993 | 3CM<br>3CMW | 35/35                  | 3.33                    | 30                 | 8686905     |
| H BODY<br>3800<br>L27                | 1993 | 3YL<br>3YLW | 35/35                  | 2.84                    | 31                 | 8686906     |
| E BODY<br>3800<br>L27                | 1993 | 3YR<br>3YRW | 35/35                  | 3.06                    | 30                 | 8686907     |
| W BODY<br>3.1L<br>L82                | 1993 | 3BH<br>3BHW | 35/35                  | 3.33                    | 30                 | 8686934     |
| N BODY<br>2.3L L40                   | 1994 | 4CLW<br>4CL | 33/37                  | 3.06                    | 29                 | 24200806    |
| N BODY<br>2.3L<br>LD2                | 1994 | 4PH<br>4PHW | 33/37                  | 3.33                    | 29                 | 24200805    |
| L/N BODY<br>3.1L<br>L82              | 1994 | 4WS<br>4WSW | 37/33                  | 3.33                    | 29                 | 24200804    |
| W BODY<br>3.1L<br>LHO                | 1994 | 4CM<br>4CMW | 35/35                  | 3.33                    | 30                 | 24200592    |

# 4T60E

## Ratio and Application Chart

| Application                     | Year      | Model Codes        | Drive/Driven Sprockets | Final Drive SRTA Part # | Speed Sensor Teeth | SRTA Part # |
|---------------------------------|-----------|--------------------|------------------------|-------------------------|--------------------|-------------|
| H BODY<br>3800<br>L27           | 1994      | 4PF<br>4PFW        | 35/35                  | 3.06                    | 31                 | 8686940     |
| C/H BODY<br>3800<br>L27         | 1994      | 4WA<br>4WAW        | 35/35                  | 3.06                    | 31                 | 8686941     |
| CAD K<br>BODY<br>4.9L<br>L26    | 1994/1995 | 4AT<br>5AT<br>5ATW | 37/33                  | 3.06                    | 31                 | 24201790    |
| N BODY<br>2.3L<br>LD2           | 1995      | 5PC<br>5PCW        | 33/37                  | 3.29                    | 29                 | 24201792    |
| A BODY<br>EXPORT<br>3.1L<br>L82 | 1994/1995 | 4AJ<br>5AJ<br>5AJW | 37/33                  | 3.33                    | 29                 | 24201788    |
| A BODY<br>3.1L<br>L82           | 1994/1995 | 4PA<br>5PA<br>5PAW | 37/33                  | 3.33                    | 29                 | 24201789    |
| L/N BODY<br>3.1L<br>L82         | 1995      | 5WF<br>5WFW        | 37/33                  | 3.29                    | 29                 | 24201791    |
| W BODY<br>3.4L<br>LQ1           | 1994/1995 | 4PB<br>5PB<br>5PBW | 33/37                  | 3.06                    | 30                 | 24200941    |
| W BODY<br>3800<br>L27           | 1994/1995 | 4BL<br>5BL<br>5BLW | 35/35                  | 3.06                    | 31                 | 24200589    |
| G BODY<br>3800<br>L36           | 1995      | 5CA<br>5CAW        | 35/35                  | 3.05                    | 31                 | 24202030    |
| G BODY<br>3800<br>L67           | 1995      | 5BF<br>5BFW        | 37/33                  | 3.29                    | 31                 | 24200590    |
| U VAN<br>3800<br>L27            | 1994/1995 | 4KU<br>5KU<br>5KUW | 35/35                  | 3.06                    | 31                 | 24201793    |
| U VAN<br>EXPORT<br>3800<br>L27  | 1994/1995 | 4PM<br>5PM<br>5PMW | 35/35                  | 3.06                    | 30                 | 24201794    |

# 4T60E

## Ratio and Application Chart

| Application                   | Year      | Model Codes        | Drive/Driven Sprockets | Final Drive SRTA Part # | Speed Sensor Teeth | SRTA Part # |
|-------------------------------|-----------|--------------------|------------------------|-------------------------|--------------------|-------------|
| C/H BODY<br>3800<br>L36       | 1995      | 5AC<br>5ACW        | 35/35                  | 3.06                    | 30                 | 24202033    |
| C/H BODY<br>3800<br>L36       | 1995      | 5AS<br>5ASW        | 35/35                  | 2.84                    | 30                 | 24202028    |
| H BODY<br>3800<br>L27         | 1994/1995 | 4YZ<br>5YZ<br>5YZW | 35/35                  | 3.06                    | 30                 | 24202029    |
| H BODY<br>3800<br>L36         | 1995      | 5BX<br>5BXW        | 35/35                  | 3.06                    | 31                 | 24202031    |
| H BODY<br>3800<br>L36         | 1995      | 5BK<br>5BKW        | 35/35                  | 3.06                    | 31                 | 24202032    |
| H BODY<br>3800<br>L27         | 1994/1995 | 4YM<br>5YM<br>5YMW | 35/35                  | 2.84                    | 30                 | 24202027    |
| C/H BODY<br>3800<br>L67       | 1994/1995 | 4YC<br>5YD<br>5YDW | 37/33                  | 3.33                    | 31                 | 24202034    |
| H BODY<br>SSEI<br>3800<br>L67 | 1994/1995 | 4KH<br>5YN<br>5YNW | 37/33                  | 3.33                    | 31                 | 24202035    |
| A BODY<br>3.1L<br>L82         | 1996      | 6PA<br>6PAW        | 37/33                  | 3.33                    | 30                 | 24204175    |
| L BODY<br>3.1L<br>L82         | 1996      | 6WF<br>6WFW        | 37/33                  | 3.29                    | 30                 | 24204177    |
| W BODY<br>3.4L<br>LQ1         | 1996      | 6PB<br>6PBW        | 33/37                  | 3.06                    | 30                 | 24204179    |
| U VAN<br>3.4L<br>LA1          | 1996      | 6PK<br>6PKW        | 35/35                  | 3.29                    | 30                 | 24204186    |
| G BODY<br>3800<br>L36         | 1996      | 6CA<br>6CAW        | 35/35                  | 3.05                    | 30                 | 24204183    |

# 4T60E

## Ratio and Application Chart

| Application             | Year      | Model Codes                      | Drive/Driven Sprockets | Final Drive SRTA Part # | Speed Sensor Teeth | SRTA Part # |
|-------------------------|-----------|----------------------------------|------------------------|-------------------------|--------------------|-------------|
| C/H BODY<br>3800<br>L36 | 1996      | 6AC<br>6ACW                      | 35/35                  | 3.06                    | 30                 | 24204174    |
| C/H BODY<br>3800<br>L36 | 1996      | 6AS<br>6ASW                      | 35/35                  | 2.84                    | 30                 | 24204181    |
| H BODY<br>3800<br>L36   | 1996      | 6BX<br>6BXW                      | 35/35                  | 3.06                    | 30                 | 24204173    |
| C/H BODY<br>3800<br>L67 | 1996      | 6YL<br>6YLW                      | 37/33                  | 3.29                    | 30                 | 24204191    |
| H BODY<br>3800<br>L67   | 1996      | 6YR<br>6YRW                      | 37/33                  | 3.29                    | 30                 | 24204192    |
| G BODY<br>3800<br>L67   | 1996      | 6CT<br>6CTW                      | 37/33                  | 3.29                    | 30                 | 24204193    |
| N BODY<br>2.4L<br>LD9   | 1996/1997 | 6CU<br>7CU<br>7CUW               | 33/37                  | 3.05                    | 30                 | 24206839    |
| W BODY<br>3.1L<br>L82   | 1994-1997 | 4AF<br>5AF<br>6AF<br>7AF<br>7AFW | 35/35                  | 3.33                    | 30                 | 24206840    |
| W BODY<br>3.1L<br>L82   | 1997      | 7AF<br>7AHW                      | 35/35                  | 3.29                    | 30                 | 24206841    |
| N BODY<br>3.1L<br>L82   | 1996/1997 | 6BS<br>7BS<br>7BSW               | 37/33                  | 3.29                    | 30                 | 24206842    |
| U VAN<br>3.4L<br>LA1    | 1997      | 7YA<br>7YAW                      | 35/35                  | 3.29                    | 30                 | 24206844    |
| H BODY<br>3800<br>L36   | 1997      | 7AC<br>7ACW                      | 35/35                  | 3.06                    | 30                 | 24206845    |

# 4T60E

## Ratio and Application Chart

| Application                  | Year      | Model Codes               | Drive/Driven Sprockets | Final Drive SRTA Part # | Speed Sensor Teeth | SRTA Part # |
|------------------------------|-----------|---------------------------|------------------------|-------------------------|--------------------|-------------|
| H BODY<br>3800<br>L36        | 1997      | 7AS<br>7ASW               | 35/35                  | 2.84                    | 30                 | 24206846    |
| W CAR<br>3800<br>L36         | 1997      | 7AW<br>7AWW               | 35/35                  | 3.29                    | 30                 | 24206847    |
| H BODY<br>SSE<br>3800<br>L36 | 1997      | 7BX<br>7BXW               | 35/35                  | 3.06                    | 30                 | 24206848    |
| W BODY<br>3800<br>L36        | 1996/1997 | 6HB<br>6AV<br>7HB<br>7HBW | 35/35                  | 3.05                    | 30                 | 24206849    |
| W BODY<br>3.1L<br>L82        | 1998      | 8AH<br>8AHW               | 37/33                  | 3.29                    | 30                 | 24211255    |
| N BODY<br>2.4L<br>LD9        | 1998      | 8CU<br>8CUW               | 33/37                  | 3.05                    | 30                 | 24211256    |
| U VAN<br>3.4L<br>LA1         | 1998      | 8DK<br>8YA<br>8DKW        | 35/35                  | 3.29                    | 30                 | 24214260    |
| W BODY<br>3.1L<br>L82        | 1999      | 9AH<br>9AHW               | 35/35                  | 3.29                    | 30                 | 24213669    |

# *4T65E Update*

## *2002-2003 Changes*

Many changes have occurred in the 4T65E pump assembly to reduce costs. These changes were implemented on June 24<sup>th</sup> 2002 on some models. These changes include:

Â A new three-piece pump design. The new design eliminates all the selective rotors and slides available for the previous design pump. All of the rotors use a tapered, random pumping chamber design (staggered spaces in the rotor).

Â The valve body sleeve that supported the rotor in the previous design pump has been moved to the pump body on the three-piece pump. In addition, some of the valve bodies are designed for a fully contented PSA while others are designed for de-contented PSAs.

Â A new internal wiring harness with revised wire lengths for the PWM and PCS as well as a new connector design for the new pressure control solenoid and PSA on 2003 models.

**New Sleeve to  
support the rotor**



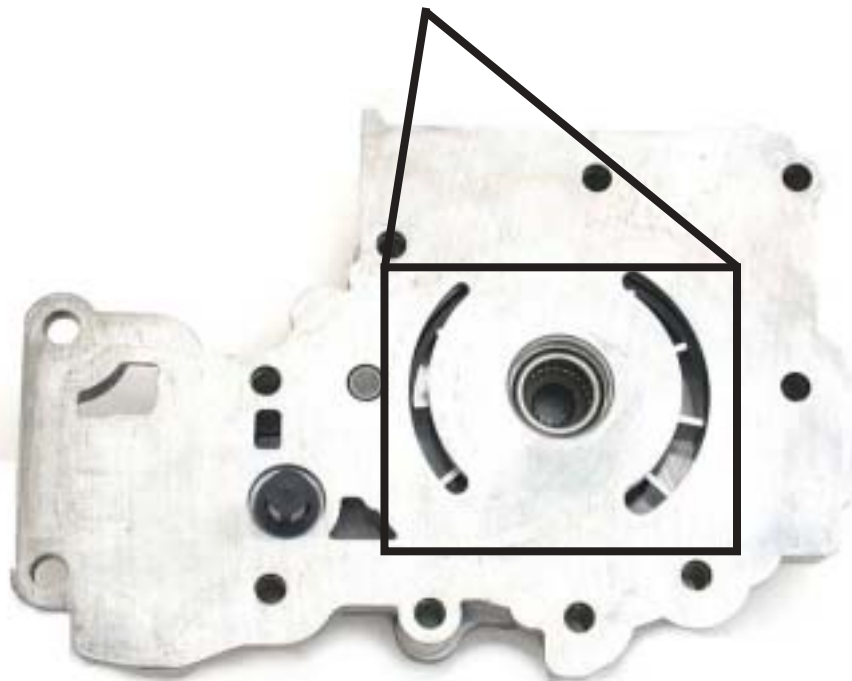
# *4T65E Update*

## *2002-2003 Pump Changes (Continued)*

GM recommends the new pump **not be installed** on earlier design applications, however, if you can successfully remove the sleeve, the pump would then be able to back service previous design units. Since this is a very confusing mid-year change we recommend that you refer to the following to identify which design pump should be in your transmission:

Â 2002-1<sup>st</sup> design two-piece pump (Part # 24221299)  
For all 2002 models including model code 2RDB with update level LESS than “7” but not 2BCB or 2RNB models with update levels GREATER than “3” use the 24221299 pump assembly.

**Earlier Design**

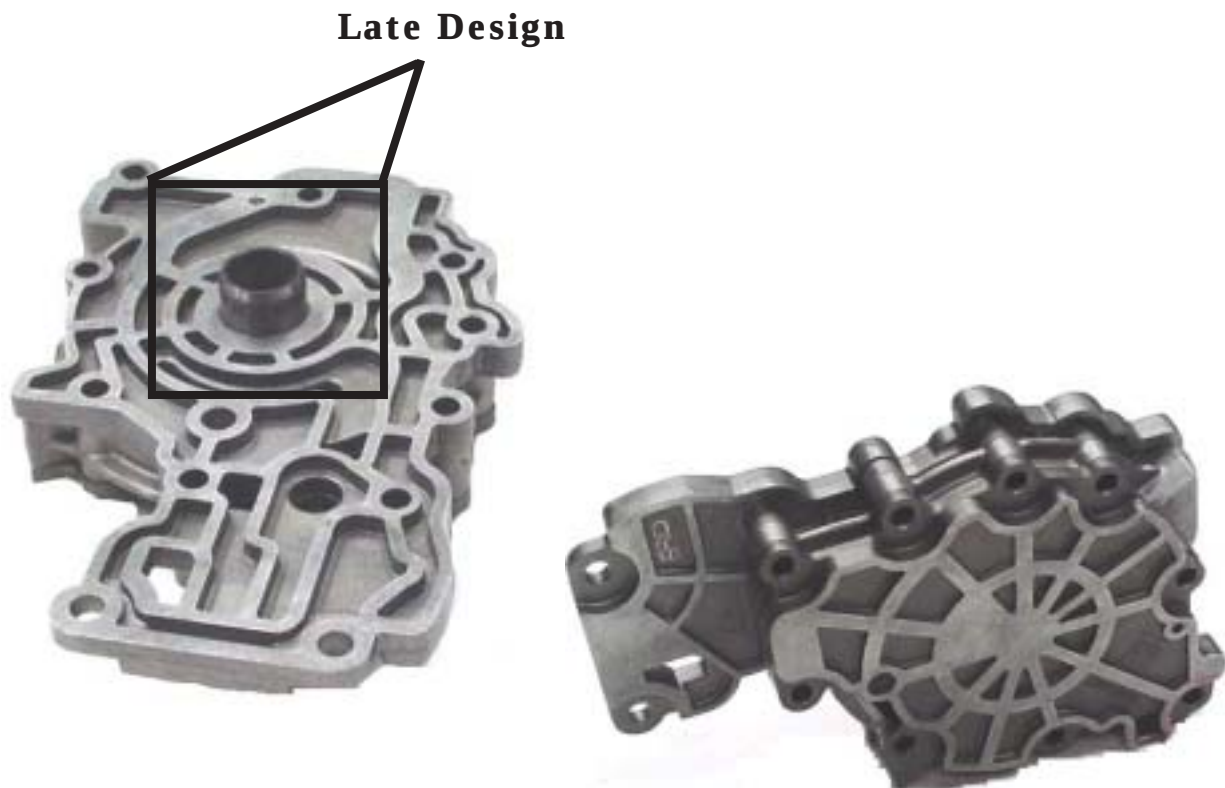


# *4T65E Update*

## *2002-2003 Pump Changes*

2002 2<sup>nd</sup> design three-piece pump (Part # 24225894) For all 2BCB and 2RNB models with an update level of “4” and 2RDB models with an update level of “7” use the 24225894 pump assembly.

2003-1<sup>st</sup> design 2 piece pump (Part # 24221299) For all 2003 models with an update level LESS than three and for model 3BCB model with update level “4” use the 24221299 pump assembly.



# *4T65E Update*

## *2002-2003 Pump Changes*

2003-2<sup>nd</sup> design 3 piece pump (Part # 24225894) For all 2003 models with an update level GREATER than “3” use the 24225894 pump assembly. ( except the 3BCB model with an update level of “4”)

As of July 15 2002 (Julian date 196) all models use the updated 2<sup>nd</sup> design pump and valve body assembly

If a model is not listed above it uses the 1<sup>st</sup> design 2 piece pump assembly.

As mentioned the valve body was also changed when the pump was changed. Part numbers are as follows:

2002-1<sup>st</sup> design valve body with support (Part # 24218255) For all 2002 models including 2RDB with update level LESS than “7” but not a 2BCB or 2RNB models with update levels GREATER than “3” use the 24218255 valve body assembly.

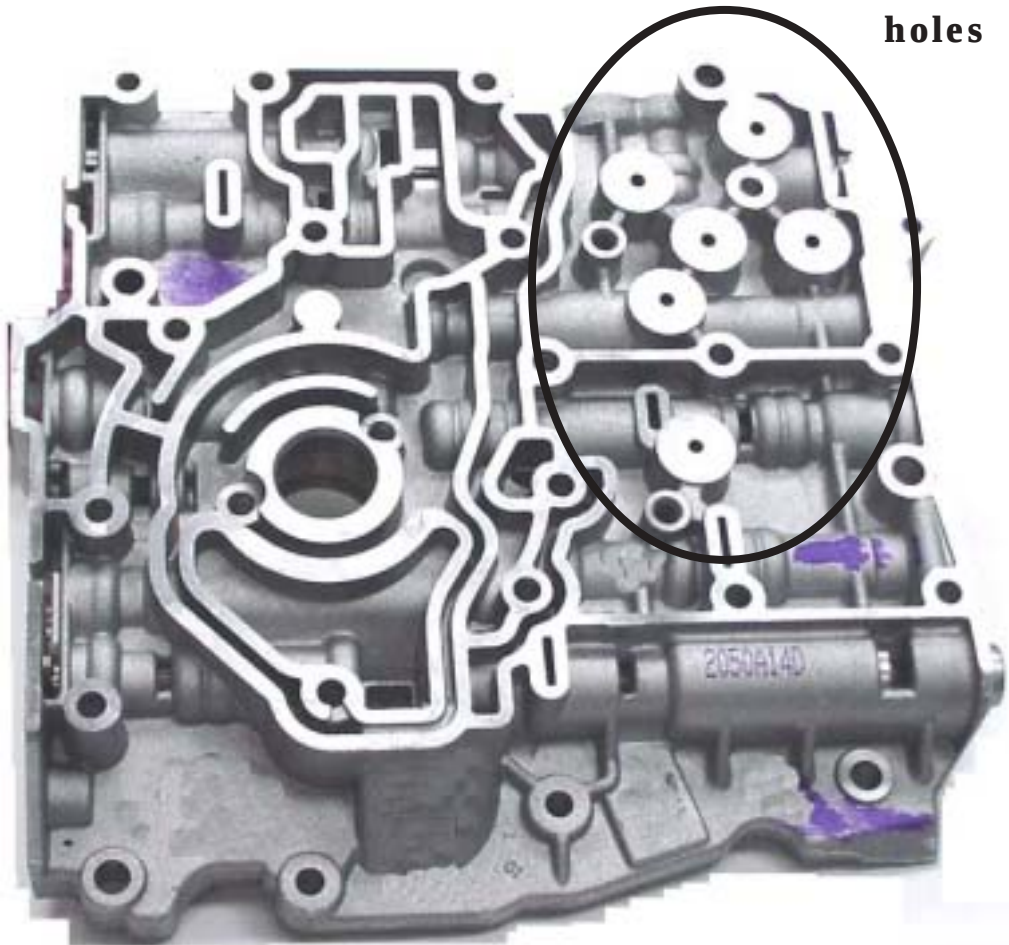


# *4T65E Update*

## *2002-2003 Valve Body Changes*

2002 2<sup>nd</sup> design valve body without the support (Part # 24225924) For all 2BCB and 2RNB models with an update level of “4” and 2RDB models with an update level of “7” use the 24225924 pump assembly.

**Valve Body  
without support  
and Six pressure  
holes**

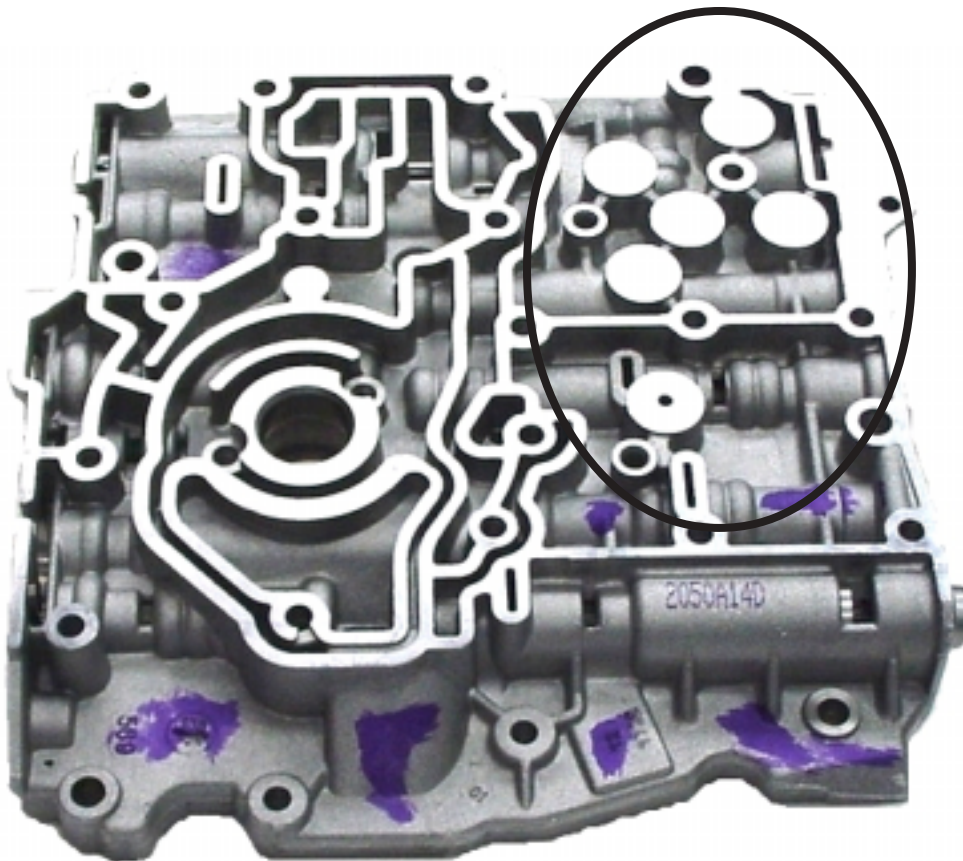


# *4T65E Update*

## *2002-2003 Valve Body Changes*

2003-1<sup>st</sup> design valve body with support (Part 24225443) For all 2003 models with an update level LESS than “3” and for model 3BCB model with update level “4” use the 24225443 valve body assembly.

**Valve Body  
without support  
and one pressure  
holes**



# *4T65E Update*

## *2002-2003 Valve Body Changes*

2003-2<sup>nd</sup> design valve body without support (Part # 24225926) For all 2003 models with an update level GREATER than “3” use the 24225926 valve body assembly. ( except the 3BCB model with an update level of “4”)

Remember, the valve body update not only includes changes to the sleeve area but also changes to the PSA area to accommodate or not to accommodate the de-contented PSA assembly so always refer to the above information before ordering parts.

The 24225926 part number is for a “new valve body”. At a future date the part number will likely be changed as a remain valve body becomes available. Check with your parts person to be sure your ordering the correct part number in the future.



# *4T65E Update*

## *2002-2003 Changes*

An IMS (Internal Mode Switch) was added to all 4T65Es. A new design replaced the previous design that used a nut to hold the design together. The update was done as a cost savings.

The new design will back service the 99 and later model 4T65Es that utilized an IMS. As with the previous design, make sure the IMS is properly positioned on the rooster comb before installing the transmission in the vehicle!! The IMS part number is 24213847



**Fastening Nut  
was removed on  
the new switch**

# *4T65E Update*

## *2002-2003 Changes*

A new PSA was added to all models for 2003. This Change meant the valve body machining, and the wiring harness/connector also changed to accommodate the new design PSA. The update was done because of contamination issues with the PSA. The vehicle software was also updated eliminating the PSA DTC P1810.

The new design PSA and wiring harness will not back service the previous applications as the valve body machining has drastically changed. The part number for the previous design PSA is 24203699, the part number for the de-contented PSA is 24216426



**Early style PSA  
ith Six switches**



**Late style PSA  
with one switch**



# *4T65E Update*

## *2002-2003 Changes*

A new design PCS was introduced for the 2003 applications. The vendor was changed from Delphi to Bosch. To accommodate the new design solenoid, the torque signal regulator valve spring tension was significantly increased. This new design will become common on all applications in the years to come.

GM does not recommend interchanging the two solenoids. If the old design is installed in a unit designed for the updated solenoid a slipping concern may occur. If the updated design is installed in an early model unit hard shift concerns may occur. The Delphi PCS part number is 10478146, the part number for the Bosch PCS is 24225825

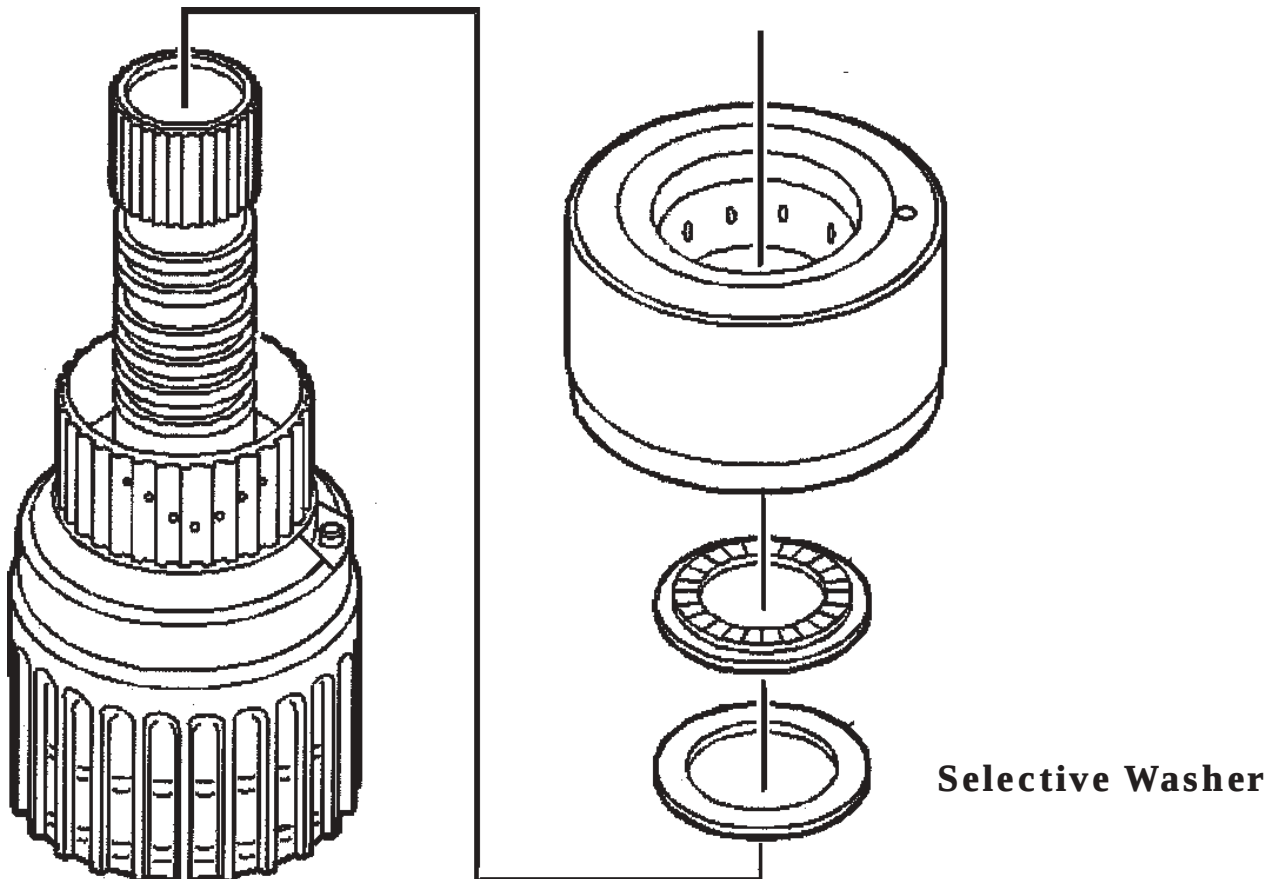


# *4T65E Update*

## *2002-2003 Changes*

A running change is planned for the input housings on all 4T65E models. The new housing will accommodate a new design input housing washer (End play washer) which is wider, to fully support the sprocket support thrust bearing. The Housing machining diameter where the washer sets is now smaller (54.5mm).

The new design washer is available in 10 selective thickness. The updated washer must be used with the updated input housing due to the machining changes. The input housing is interchangeable with earlier years.



# *4T65E Update*

## *2002-2003 Changes*

The input and 3<sup>rd</sup> one way clutches were updated as of July 17<sup>th</sup> 2002 on some models. Full implementation is scheduled for February 2003. The new one way clutches are a “PAWL” design (commonly referred to as a diode) rather than the sprag design that has been used since the 4T65E was introduced in 1997. In addition, the new pawl design assembly requires new design input clutches. The new clutch plates utilize a wave design spline and are thicker than the previous design components. This update was done because of durability problems with the previous design components.

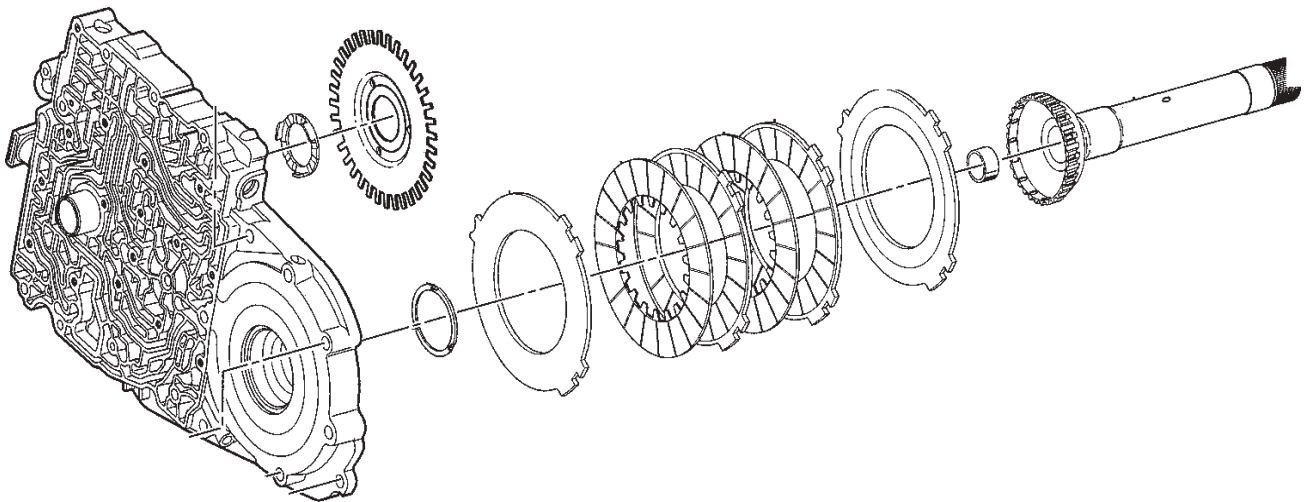
The pawl design one way clutches are not currently serviced other than as an assembly. In other words, the pawl components are not available as individual pieces. The clutches must be changed if the pawl design one ways are installed in a previous design application. The pawl one way clutch part numbers are 24216516 for the input and 24216517 for the 3<sup>rd</sup>. The new input clutch part number is 24216502.

# *4T65E Update*

## *2002-2003 Changes*

A mid year change for the 4<sup>th</sup> clutch is planned. The 4th clutch apply plate has an additional mounting tab added to it for easier installation. In order to accommodate this change the channel plate was also updated.

The previous design channel plate cannot be used to service the updated design with the new apply plate. The Updated design channel plate will back service previous applications. The updated disc/plate designs will not back service unless the channel plate is also changed. GM is planning on releasing the parts as a service package which will include the channel plate, apply plate and friction plates.



# *4T65E Update*

## *2002-2003 Changes*

Mid year change included a 2<sup>ND</sup> lock ramp was added to the pass through connector. This design prevents the connector from side loading.

This change has no effect on service as the harness was only updated for the new 2003 harness applications.

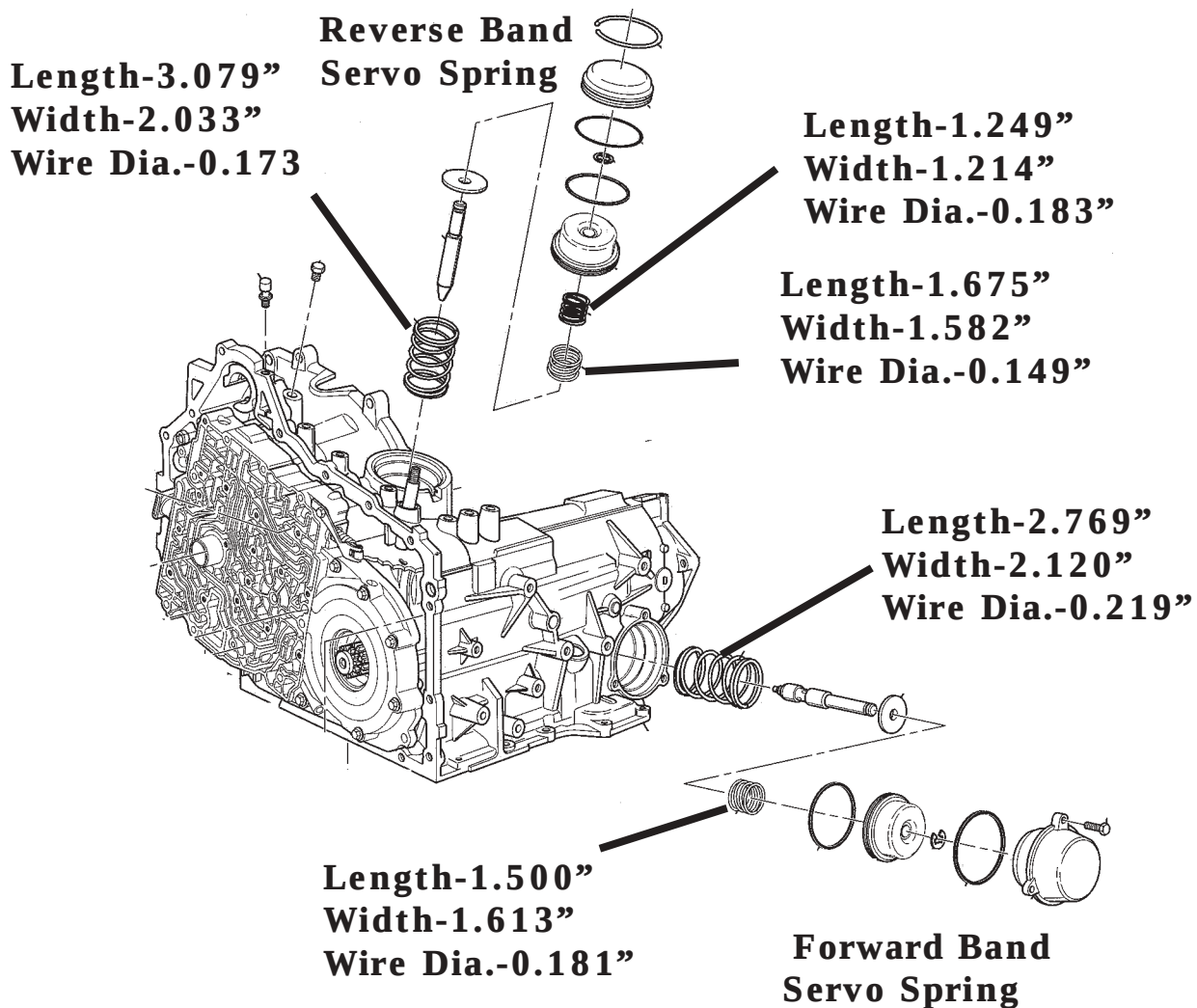


**Make sure your new  
harness has the new clip**

# 4T65E

## *Harsh or Soft Forward or Reverse Engagement*

When rebuilding a 4T65E make sure you have the correct servo springs assembled in their correct locations. Because the 4T65E uses a Forward and Reverse servo for engagement if the springs were switched accidentally you may experience a harsh or soft forward or reverse engagement.



# 4T80E

## TCC Concern

### *Lock-up on the 2-3 Shift, Erratic TCC Operation*

When encountering a TCC concern with a 4T80E transaxle, make sure you have the correct TCC PWM solenoid installed. To verify the correct solenoid check the Julian date. This date may be located in a number of different places including, top cover, connector top / bottom, or body assembly. To ensure you have the correct solenoid make sure the Julian dates are NOT within 1137-1171. If you have a solenoid between these numbers you will need to replace the solenoid assembly. Part # 24212690

***Do Not Use Solenoids With The Numbers Between 1137 and 1171***

**Part numbers may  
be on the top hat or  
on the back side of the  
connector**



# 4T80E

## *Hard Shifts Possible DTCs Set Northstar Application*

Oldsmobile and Cadillac vehicles exhibiting any or all of the following conditions:

- ⌘ Surge especially when TCC is applied
- ⌘ Engine backfire
- ⌘ Hard shifts
- ⌘ SES lamp or message displayed on DIC
- ⌘ Any combination of the following DTCs may be set, P0335, P0385, P1372, P0341, P1599

The Northstar engine applications utilize two crank sensors and one cam sensor. The crank sensors are different part numbers and are also different colors (Grey and Black plastic). If one of the crank sensors fail or if a loss of signal occurs the PCM will raise line pressure resulting in harsh shift concerns. If the Cam sensor fails, DTCs may set and drivability concerns may be present, but shift feel will remain normal.

Inspect the sensor connector pin tension and the terminal crimp. If pin tension is good replace the suspect sensor.

NOTE: If a crank sensor is replaced the “RELEARN PROCEDURE” for the crank sensor must be performed using a scan tool. Failure to relearn the crank sensor value will result in a DTC being set and possible drivability concerns

**Crank Sensor**



**Crank Sensor**



## ***4T80E***

### ***MAF DTC, Poor Drivability, Surge with TCC ON Under load, Lack of Power***

Oldsmobile/Cadillac G, K and K special applications with the Northstar engine and the 4T80E transmission may exhibit any or all of the following conditions:

- Â Surge with TCC ON. This is most common at low speeds when you are crowding the accelerator on a slight incline. The surge is most commonly felt during throttle “Tip In” acceleration and generally goes away as the throttle is held steady.
- Â Possible Lean fuel trim DTCs, MAF DTCs, Misfire DTC’s and/or Pre cat DTC’s may be set.
- Â A possible lack of power may also be present

Cause: Two common causes for this condition exist, they are:

1. The MAF sensor is dirty or skewed
2. The air cleaner air box may be filled with water or other contaminants.



## ***4T80E***

### ***MAF DTC, Poor Drivability, Surge with TCC ON Under load, Lack of Power (Continued)***

Skewed MAF sensors are quite common with these applications. Generally, fuel trim values will be around +20% when the surge is present. If this occurs, clean or replace the MAF sensor and clear any DTCs that may be set.

If the concern is on a 95-97 application, check the air cleaner air box for water and other contaminants. If water is present enlarge the air box water drain hole to at least ½”.

**Look for contamination  
in the inlet air hole**



# ***4L30E/5L40E***

## ***P0601/P0602***

1999-2002 4L30E/5L40E applications may set DTCs P0601 and/or P0602. These codes indicate a failure in communication with the TCM/ECM. In most instances the transmission will have clutch damage. If these DTCs are set due to their default values.

The DTCs will react as follows:

### **P0601 will set if:**

⌘ The TCM check sum is incorrect (internal software check)

### **If a P0601 is set:**

⌘ The TCM will flash the sport mode lamp and it will send an MIL request message to the ECM on the second consecutive trip in which a failure occurs.

⌘ The ECM records the freeze frame and failure record information and turns on the MIL lamp.

⌘ The TCM defaults the transmission by, raising line pressure to maximum, commanding 4<sup>th</sup> gear (4L30E), or 5<sup>th</sup> gear (5L40E) while inhibiting TCC and freezing adapts. NOTE: Even though the units default to high gear, if manual ranges are selected the unit will start in lower gears. If the customer does not manually override the default high gear start, damage to the transmission clutches may occur

## ***4L30E/5L40E***

### ***P0601/P0602 (Continued)***

P0602 will set if:

• The PCM was not correctly programmed or has not had a calibration loaded

If a P0602 is set, the ECM will turn on the MIL and record a freeze frame regarding the failure on the 1<sup>st</sup> drive cycle the failure is present. Possible EMI (Electromagnetic Interference) during power up or a faulty TCM (if a P0601 is also present). If a P0602 is present the ECM may not be properly calibrated.

Repair the EMI condition or replace the TCM if a P0602 was set. When diagnosing a P0601 and/or a P0602 set in the TCM do not attempt to reprogram the TCM.

If a new TCM is required simply install it and clear the ECM DTCs that are set. If the P0602 resets update the ECM software with the latest calibration designed to address P0602 concerns.



## ***4L60E***

### ***Slips When Cold***

The Chevrolet Trailblazer, GMC Envoy and Oldsmobile Bravada utilize a new style cooling fan. The new electronic viscous clutch fan is computer controlled. A design characteristic of the viscous coupling may lead the customer to misinterpret the fan operation as a possible transmission slippage condition. Some cold start fan noise is normal, but it's possible that the unit may exhibit excessive noise if the vehicle has been left sitting overnight or for extended periods of time.

It is common for the viscous coupling to leak fluid from its internal reservoir into the coupling, leading to tremendous amounts of noise on a cold start, or as the vehicle is accelerated.

An updated electronic clutch fan has been released to address this concern. The new part was introduced as a running change on the 2003 model year applications.

**The new part  
number is  
15192192.**



# ***4L60E***

## ***Shift Complaints***

2002 Trailblazer/Envoy/Bravada

Several shift quality concerns have arisen with this application including:

- Â Hard/soft garage shifts
- Â Delayed downshifts
- Â Harsh 1-2 shifts

Several calibrations have been released to address these concerns. The latest update is calibration number 12579253. Make sure to visit the GM calibration web site at: **<http://calid.gm.com/vci/>**

## 4L60E

### *Intermittent neutral or flare, bump when accelerating from a stop*

1999 and later 4L60E applications (Silverado, Tahoe, Yukon, Suburban, Sierra) may exhibit a neutral condition while in D4 range and the vehicle is accelerated from a stop. In addition, a complaint that the transmission neutrals, then bangs into gear (harsh engagement) when accelerated from a stop.

Generally the problem is not related to the internal transmission components (Sprag, roller, forward clutch). The most common cause of this concern is the transmission shift cable or the shift cable adjustment.

First try making an adjustment, if you determine the cable is stretched replace the transmission shift cable and adjust.



## ***4L60E***

### ***Surge/Shudder/Miss***

1995-2002 Trucks with 4.3L (RPO L35 or LU3) engine may experience a rough running, or surge/shudder/miss problem. This condition may be associated with a DTC P0300. Many times this condition has been confused with a transmission related concern.

The problem is often caused by moisture leaking from the A/C line onto the distributor. On several of the applications, the A/C line is routed directly over the distributor. This moisture leads to corrosion, and crossfire within the cap.

Inspect for the following:

⌘ White corrosion/residue on the cap wall, or on higher mileage units brown residue



**Locate the AC hose above the Distributor and install a foam conduit over the hose which will allow the water to drain off the sides.**

## ***4L60E***

### ***Surge/Shudder/Miss (Continued)***

- Â Rotor: Inspect for black streaks on the plastic surface of the rotor or green spots on the copper surface of the rotor terminal.
- Â Distributor housing/base: Inspect for excessive levels of rust on the shaft or surface contamination on the cam sensor hold down screws.

If you find evidence of corrosion replace the cap/rotor and the distributor if deemed necessary. Take 8" of foam pipe insulation (you can buy it a hardware store) and wrap the a/c pipe above the distributor with the pipe insulation.

Note: The distributor is referred to as an HVS "high voltage switch" by General Motors.

# 4L60E

## 1-2 Shift Shudder Hot

2000-2002 C/K Trucks with a concern of a shift shudder during the 1-2 shift is mostly common under light throttle conditions, after the vehicle has reached full operating temperature and ambient temperature is high.

The problem is usually caused by a frequency signal riding on the generator output . The signal is causing interference problems with the PCM circuitry.

Install a sense lead for the Alternator as follows:

Parts:

Connector replacement pack 15306009

1 ring connector pack 02984172 (sold as packs of 10)

RTV sealer



### Procedure:

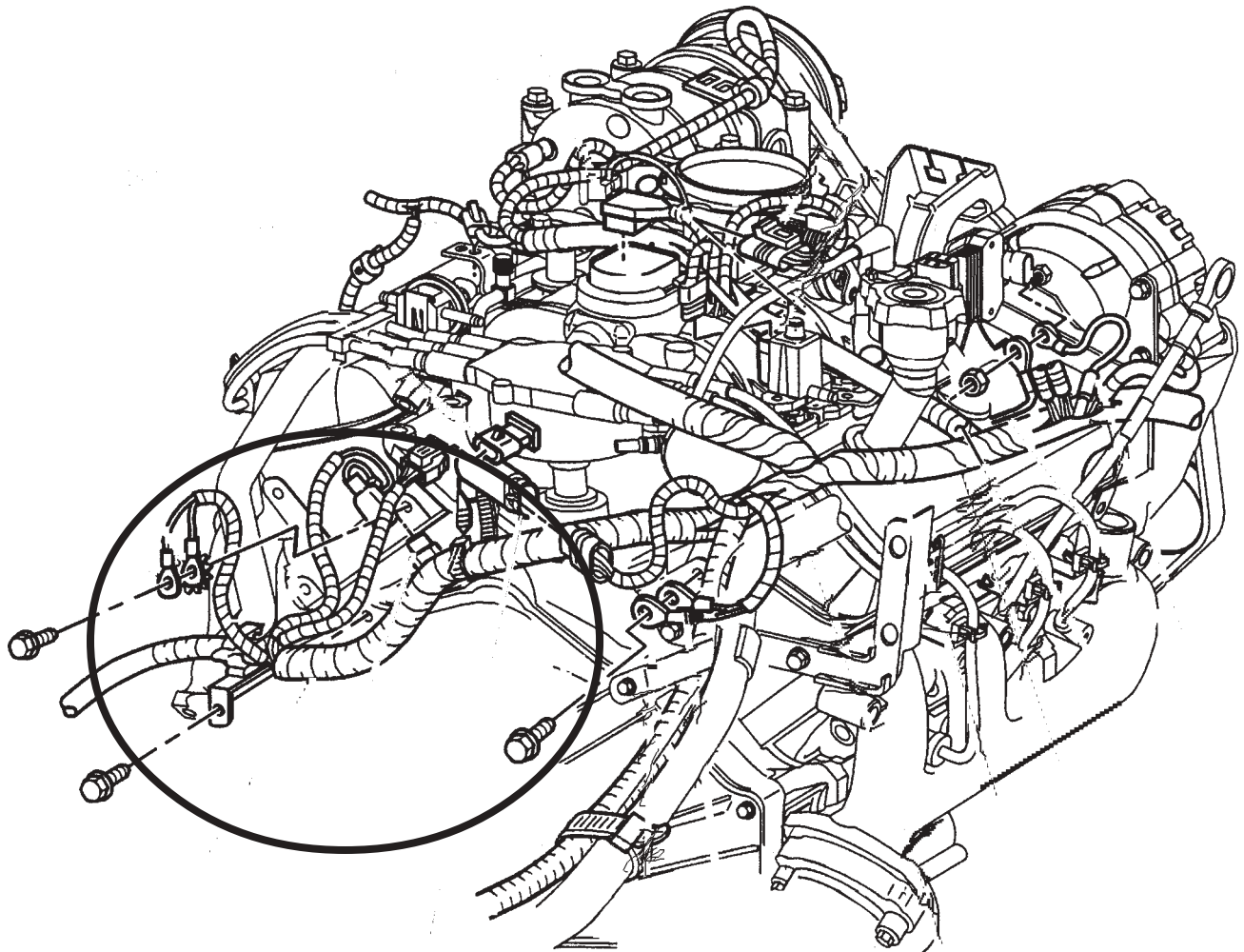
1. Disconnect the negative battery cable
2. Remove the two-wire, four-cavity connector from the alternator
3. Remove the brown wire (cavity B) and the gray wire (cavity C)
4. Remove the wires from the connector pack and discard wires "B" and "C"
5. Install the brown wire from the vehicle harness into cavity B of the service connector. Install the gray wire from the vehicle harness into cavity C of the service connector.
6. Install the TPA (Terminal Position Assurance Clip) into the service connector and install the service connector into the alternator.
7. Hook the wire in cavity "D" of the service connector to the battery terminal on the alternator using the ring connector.
8. Trim the wire in cavity "A" of the service connector flush
9. Seal the connector with RTV and connect the negative battery cable.

# 4L60E

## *Multiple DTC'S*

Some 1995-2000 M/L (Astro, Safari) vans may experience DTCs setting related to the transmission or possibly engine related systems. The most common DTC is P0758 (3-2 solenoid) but others may set as well.

The wiring harness runs along the bell housing area and over the engine. In many instances the harness contacts the A/C accumulator which leads to a rub-through condition. Depending on which wires have insulation damage, a DTC will likely set for that circuit.



# *4L60E ATC DTC C0379*

## *Service 4WD Light On K T rucks*

Some K-trucks with the automatic transfer case may experience the following conditions:

- Service 4WD light is on
- DTC C0379 is set
- The front actuator no longer functions

The wiring harness for the front axle circuit may be chafed near the A/C compressor.



**Secure the harness so it can no longer contact the A/C compressor.**

# 4L60E

## *Delayed Downshift*

2002 Trailblazer, Envoy, Bravada, T truck 4.2L (LL8) applications may experience “any or all” of the following conditions:

- Delayed downshifts, erratic downshifts
- Excessive cooling fan noise
- SES light ON
- Any or all the following DTC's, P0014 (Cam Phaser Performance)  
P1683 Low power counter failure) P0116 (High side coolant  
rationality)

This concern is caused by calibration problems. An updated calibration has been released to address the concerns. View the GM web site <http://calid.gm.com/vci/> to locate the correct calibration number for your application.



## ***4L60E/4L65E***

### ***Updated PCS***

A new pressure control solenoid was used for all 2003 model units. The vendor for the solenoid is now Borg Warner and will be available in two versions. The 1<sup>st</sup> design utilizes only one flat on the aluminum body of the solenoid while the 2<sup>nd</sup> design has two flats on the solenoid body. The 2<sup>nd</sup> design will replace the 1<sup>st</sup> design and is scheduled for use in other transmission applications starting in the 2004 model year. In addition to the solenoid change, the harness was also changed to accommodate the updated solenoid.

The 1<sup>st</sup> design solenoid went into production at SOP (Start of Production) 2003 while the 2<sup>nd</sup> design was introduced in December 2002 as a running change for the 2003 model year. The part number for the 1<sup>st</sup> design solenoid is 24219308 while the 2<sup>nd</sup> design part number is 24224905. The harness was updated to prevent someone from interchanging the Borg Warner solenoid with the previous Delphi solenoid. The updated harness part number is 24222891.

**Make sure the  
correct solenoid is  
used for the cor-  
rect vehicle**



# *4L60E/4L65E, 4L80E/4L85E, LCT 1000 DTC U1241 SET*

Most OBDII equipped vehicles have DTCs related to data line problems. Some technicians may notice a DTC U1241 set in history on vehicles equipped with a BCM. U1241 may be stored in several of the various modules. In addition, the technician may have noted that the DTC may have not been present until after DTCs were requested or displayed .

U1241 DTC is caused by a loss serial data. The loss of data is caused by your scan tool interface with some of the modules on the vehicle. When your scan tool requests DTCs from some of the modules it becomes the master module which results in other modules setting the U1241 in memory.

This is a normal condition, no repairs should be attempted if the condition for setting the DTC is as described above.



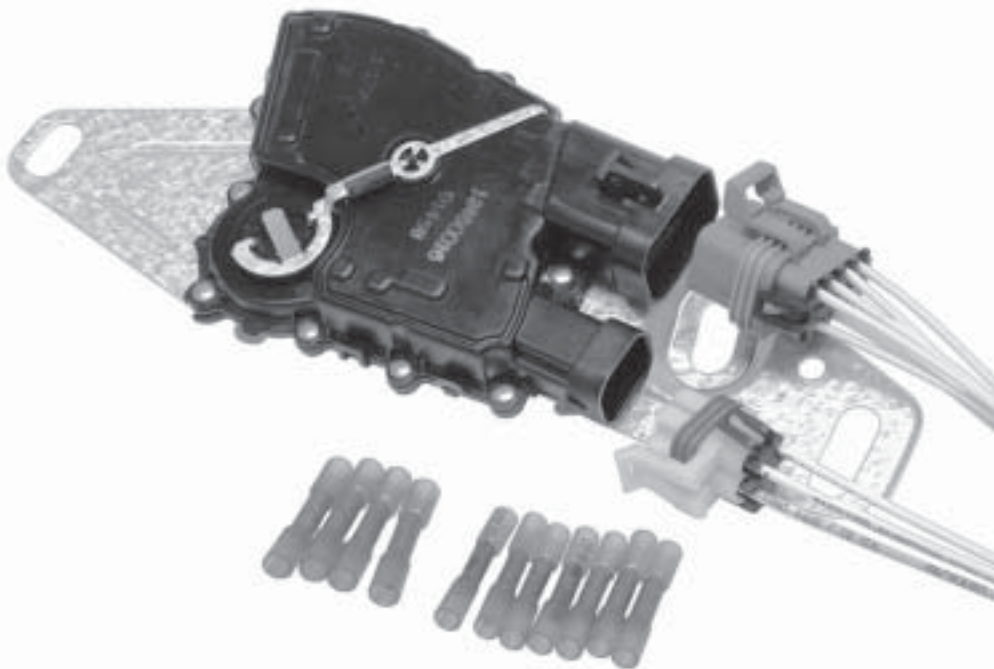
## ***4L80E/4L85E***

### ***P0706 Set***

Vehicles with a 4L80E/85E transmission may set a code P0706 (Transmission Range Switch Performance) and may exhibit a no start condition.

In many instances the P0706 is not caused by a faulty switch. On 1999 and later applications check for a possible recalibration for this condition prior to replacing the switch.

Before part repairs are done check the web site <http://calid.gm.com/vci/> for updated calibration to repair the false P0706.



**NOTE: Always check the connections for melting and wire damage**

## **4L80E**

### ***TCC surge or chuggle when road speed is between 40-50 mph***

On 1994 and later Diesel 4L80E applications, customers may complain of a surge or chuggle condition which occurs only when the TCC is applied and the vehicle is between 40 and 50 mph. If the TCC is disabled, the surge/chuggle is typically eliminated. You will also find that disconnecting the EGR on 6.5L Diesel applications (RPO L56) may also eliminate the concern.

The typical cause of this concern is retarded pump timing. Checking the pump timing requires a scan tool.

To determine if the timing is correct, note the data parameter known as "TDC offset" using a scan tool. The value should be minus -.75 or less. A minus number on the scan tool indicates the timing is advanced while a plus (+) value indicates the timing is retarded. For proper operation, fuel economy and power, the timing TDC offset should read -1.25 to -1.50. If the timing is not correct a TDC relearn procedure should be performed after the timing has been set. . (Note: to perform a TDC relearn on a 1994-95 application you must use a scan tool. It should be noted that not all scan tools are capable of performing a TDC relearn procedure)

## ***4L80E***

### ***TCC surge or chugle when road speed is between 40-50 mph (Continued)***

If the Timing is incorrect:

Shut the engine off and loosen the pump bolts slightly. Using the proper adjustment tool move the pump slightly (.040" of movement = 1 degree of timing change). Move the pump toward the drivers side of the vehicle to advance the timing and toward the passenger side of the vehicle to retard the timing. Once the pump is moved slightly, tighten the pump bolts and perform the TDC offset learn procedure using a scan tool.

To perform the TDC offset procedure on a 1994-95 application

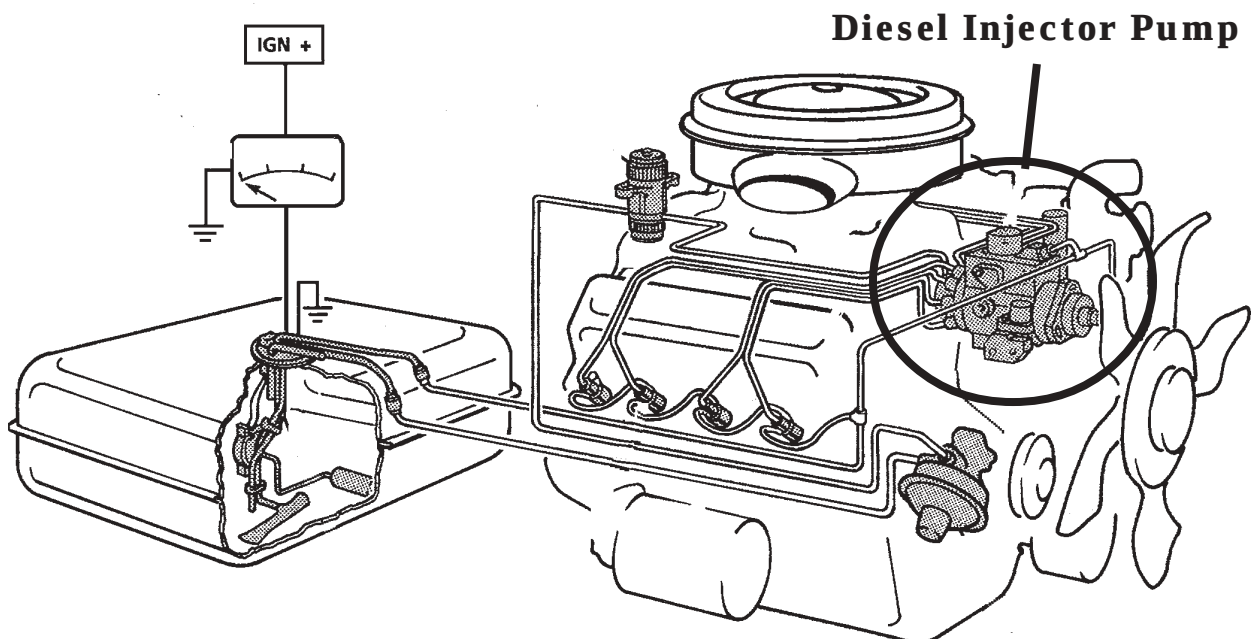
Start the engine, Press the button on the scan tool to engage the TDC offset procedure and note the value when the scan tool locks in the TDC offset value. It should read between -1.25 and -1.50. If so, no further adjustments are needed. Once the relearn is complete, check the TDC offset value displayed on the scan tool again. If the offset value is not correct, shut off the engine, loosen the pump bolts and rotate it in the desired direction. Tighten the bolts and repeat the above TDC offset learn procedure.

## 4L80E

### *TCC surge or chuggle when road speed is between 40-50 mph* *(Continued)*

To perform the TDC offset procedure on the 1996 and Later applications:

1. Turn on the ignition key and clear all DTC's
2. Depress the throttle to the WOT position and hold it there for at least 4-5 seconds
3. Key off and then close the throttle
4. Wait 30 seconds minimum
5. Key on and start the engine
6. The TDC offset will be automatically learned when the coolant temperature reaches 170-172 degrees Fahrenheit.
7. If the vehicle is already above the minimum 170 degree CTS value, TDC learn will automatically update as soon as the engine is started in step five.



## ***4L80E***

### ***TCC surge or chuggle when road speed is between 40-50 mph (Continued)***

Note: On most 1996 applications the value displayed on the scan tool (TDC offset) will remain at 0.00 (At step 5) until the TDC learn has been completed. On most 1997 and later applications, the value displayed on the scan tool will remain at the previous value until the TDC learn has been completed.

TDC offset should read between -1.25 and -1.50. Once the relearn is complete, check the TDC offset value displayed on the scan tool again. If the offset value is not correct, shut off the engine, loosen the pump bolts and rotate it in the desired direction, tighten the bolts and repeat the TDC offset learn procedure.

On L56 (EGR equipped 6.5L Diesel) applications, if the timing is correct and the problem is eliminated when the EGR is disconnected, replace the EGR with part number 12530288.

**The EGR is located  
behind the dipstick**



## 4L80E

### *Planetary gear noise in 1<sup>st</sup> and 2<sup>nd</sup> gears only*

Some 4L80E transmissions may exhibit excessive planetary gear noise when operating in 1<sup>st</sup> and 2<sup>nd</sup> gears. This noise will resemble the noise developed from HD 4L80E applications which use straight-cut gears. Upon inspection, you will notice some irregular wear lines on the reaction planetary carrier pinion teeth and possibly on the sun and ring gear teeth. These wear lines run parallel to the transmission center line. The wear may look like dark lines on the gear teeth, grooves in the gear teeth or bronze lines on the gear teeth.

This concern can be caused by either:

Â A reduction in the volume of lube oil feeding the planetary. This problem is typically caused by pump cavitation, a restricted filter or damaged oil pan, or a cooler flow rate problems.

Â Output shaft misalignment. This concern is the most common cause of the noise on 97 and later applications. Misalignment of the output shaft will cause side loading of the planetary. This problem generally leads to the technician replacing the planetaries only to have a repeat failure within 5-20 thousand miles.

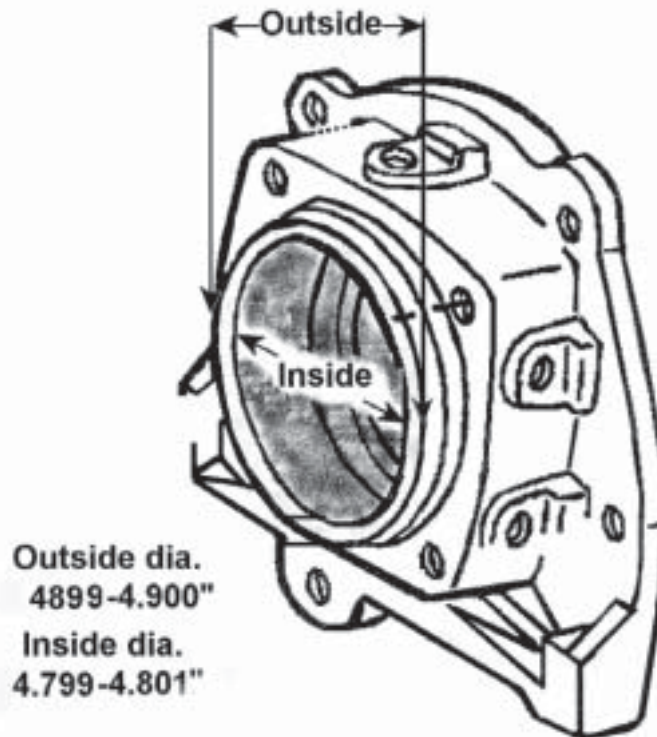


## 4L80E

### *Planetary gear noise in 1<sup>st</sup> and 2<sup>nd</sup> gears only*

If shaft alignment is suspected on a 4wd application, inspect the 4wd adapter. We have measured brand new adapters that have had excessive offset! To inspect the transfer case adapter measure the transfer case pilot inside and outside diameter. The outside diameter specification is 4.799"-4.801" while the inside diameter specification is 4.899"-4.900".

If the measurements are not correct, replace the adapter. On 2wd applications a common cause of the concern is the position of the output shaft bushing. If the bushing or bore was machined off center, side loading of the shaft will occur. On 2wd applications, you will typically be able to see that the bushing is worn off center. Replace the bushing or the case as necessary.



# ***4L80E HD/4L85E***

## ***Product Updates***

Several midyear changes were made to the 2001 4L80E HD model transmissions. These changes were also carried over to the 4L85E transmission. The changes were designed to improve the transmissions durability. These changes include:

| Part number call out     | GM part number           |
|--------------------------|--------------------------|
| Overrun clutch housing   | Included in the kit only |
| Overrun clutch spring    | Included in the kit only |
| Overrun clutch snap ring | 24216149                 |
| Overdrive roller clutch  | 12431003                 |
| Overdrive carrier        | 24215530                 |

Some of the components are only available by ordering an upgrade kit part number 24222160



**AC-Delco Kit #24222160**

# 4L85E

## 2002 Models

The 4L80E HD has been replaced by the 4L85E. The 4L85E is used in vehicles equipped with the 8.1 L gas engine (RPO L18).

### Identification

Model Tag: 02CAP or 02CCP

RPO Code: MN8

### Features:

- Â The speed sensor bolts. New part number 11517516
- Â The forward clutch wave plate. New part number 24205560
- Â Overrun clutch spring retainer. New part number 24216149



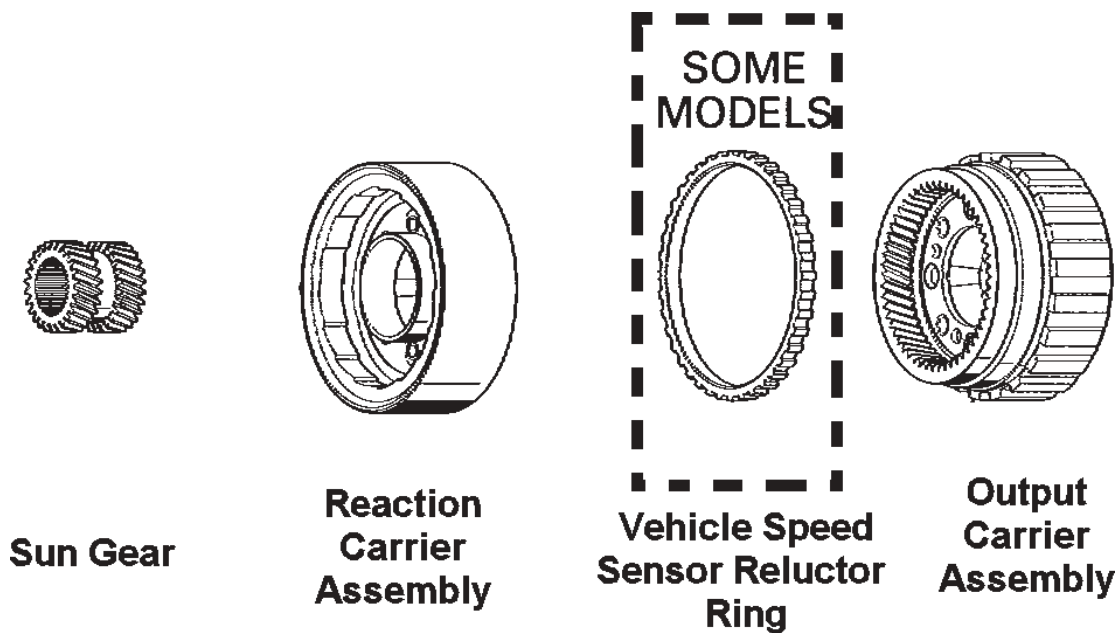
# **4L85E**

## **2002 Models (Continued)**

The 4L85E uses a five-Pinion reaction and output carrier.

- Â Reaction carrier part number 24215026
- Â Output carrier 2WD models part number 24214966
- Â Output carrier 4WD models part number 24215388

(NOTE: The straight cut gears used in the 4L80HD applications are no longer available from GM. If a 4L80E HD planetary requires replacement, update the unit with the part numbers listed above for the 4L85E applications.



# *LCT 1000*

## *Incorrect Pressure Switch Assembly Readings*

Allison transmissions used in GM truck applications may indicate the wrong pressure switch assembly readings for 5<sup>th</sup> gear and/or reverse range. Vehicles that have had the TCM reprogrammed or vehicles built after March 2001 may have an incorrect switch sequence. Incorrect values may be displayed when monitoring the transmission operation with a scan tool when those values are compared to the listings in the shop manual. This may lead to misdiagnosis of the PSA or its circuits.

Programming changes dealing with the scan tool interface can lead to the incorrect sequence for the application. The chart below lists the correct sequence for the LATER (after March 0f 2001) Allison calibrations.

NOTE: Switch C/D and E are normally open while switch R is normally closed. Your scan tool may display the switch values as open/closed or as on/off. On=closed, Off=open

On applications built after March 2001 or on units that have been reprogrammed, Switch “C” will read “Open” (OFF) when the transmission is in reverse while those built earlier will read “Closed” (ON).

# *LCT 1000*

## *Incorrect Pressure Switch Assembly Readings*

| Range          | Switch C    | Switch D    | Switch E    | Switch R    |
|----------------|-------------|-------------|-------------|-------------|
| 5th - Late     | Closed / ON | Open / OFF  | Closed / ON | Open / OFF  |
| 5th - Early    | Open / OFF  | Open / OFF  | Closed / ON | Open / OFF  |
| 4th            | Closed / ON | Open / OFF  | Closed / ON | Open / OFF  |
| 3rd            | Closed / ON | Open / OFF  | Open / OFF  | Open / OFF  |
| 2nd            | Open / OFF  | Open / OFF  | Open / OFF  | Open / OFF  |
| 1st            | Open / OFF  | Closed / ON | Open / OFF  | Open / OFF  |
| Neutral        | Closed / ON | Closed / ON | Closed / ON | Open / OFF  |
| Reverse-Late   | Open / OFF  | Closed / ON | Closed / ON | Closed / ON |
| Reverse- Early | Closed / ON | Closed / ON | Closed / ON | Closed / ON |

# *LCT 1000 (RPO M74)*

## *Flare When Accelerating From a Stop*

LCT 1000 applications may experience a condition described as a “flare” or “neutral” condition when coming to a stop or accelerating from a stop. A harsh engagement may occur as the unit reengages 1<sup>st</sup> gear. Many times, when the condition is present, input speed will be present even though the transmission is being commanded to 1<sup>st</sup> gear with TP and VSS values at 0.

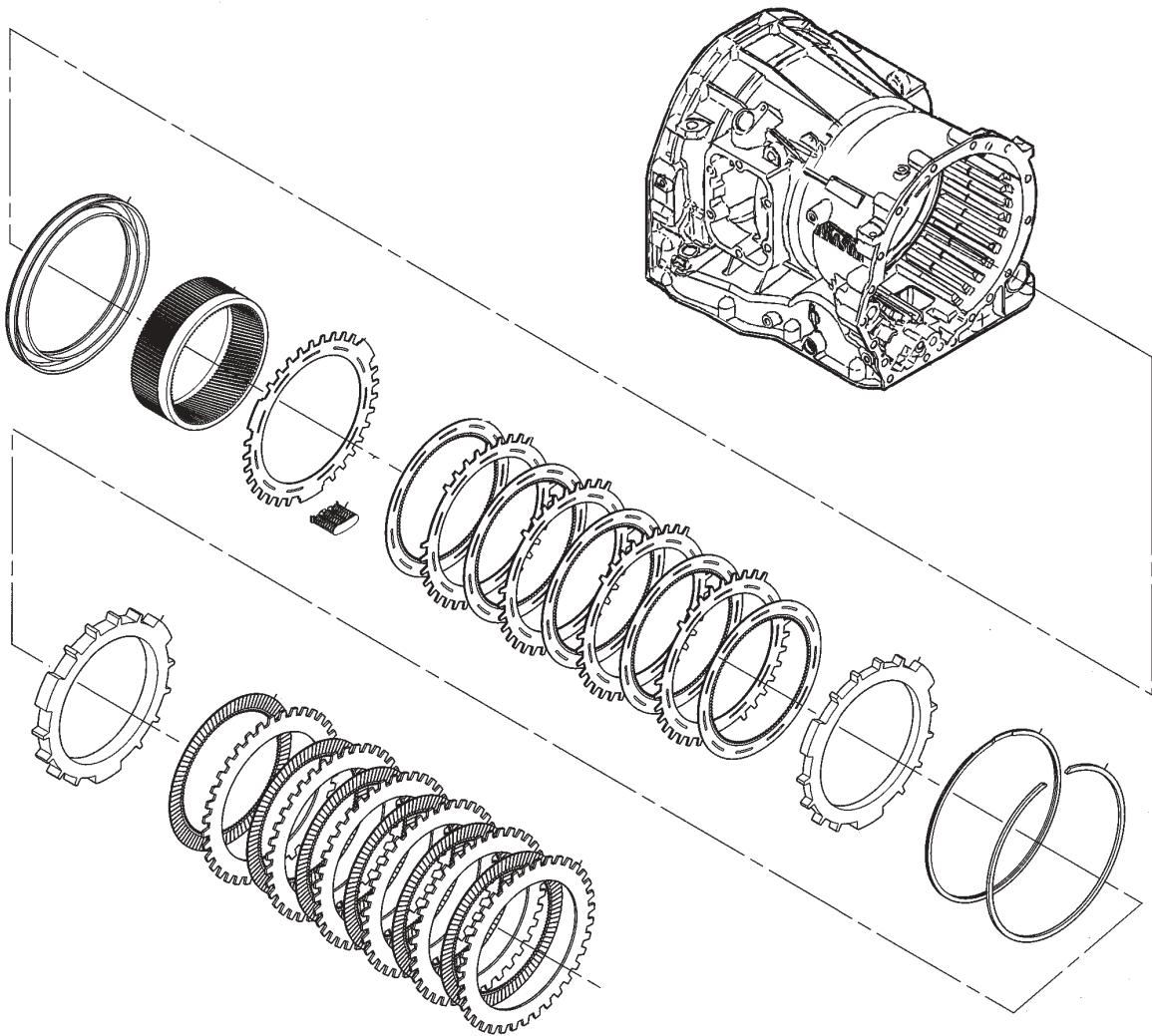
The most common cause for this concern is:

- Â Leakage in the C5 clutch or its circuit: If you perform a clutch test using your scanner, you will generally notice the condition when the 2-1 downshift is commanded. This will be indicated by a delay in line pressure response when the C5 Clutch is commanded to apply.
- Â Sticking valves: Most of the sticking-valve-related concerns have proven to be temperature related with this transmission.
- Â TCM calibration: An updated calibration has been released aimed at improving this condition. The updated calibration was released in March 2002. Check the GM web site to see if your vehicle has been updated with the new calibration.  
<http://calid.gm.com/vci/>

# *LCT 1000 (RPO M74)*

## *Flare When Accelerating From a Stop (Continued)*

### **C-5 Clutch Assembly**



# *LCT 1000 RPO M74*

## *PRNDL Inoperative*

A visual inspection of the PRNDL display may no longer be present, while other times it may indicate the incorrect position or an incomplete display. In addition, an erratic shift, no shift or several other related shift concerns may be present. The MIL will also be ON in most instances and a DTC may be set relating to the NSBU switch/circuit. This condition is very common on applications that are operated in wet or muddy conditions.

- Water intrusion into the NSBU switch (neutral safety switch)

During normal operation the TCM sends battery voltage to each of the NSBU switches (A, B, C, and P connector C1). As the switch changes position, each switch is connected to ground via circuit 451 pin D of connector C2.

**NSBU Switch Table**

| Selector Position                                                                                                                                                                                                                                                             |   |   | A   | B   | C   | P   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|-----|-----|-----|-----|
|                                                                                                                                                                                                                                                                               | P |   | OFF | ON  | ON  | OFF |
|                                                                                                                                                                                                                                                                               | R |   | OFF | OFF | ON  | ON  |
|                                                                                                                                                                                                                                                                               | N |   | ON  | OFF | ON  | OFF |
| 5                                                                                                                                                                                                                                                                             | 5 | 5 | ON  | OFF | OFF | ON  |
| 3                                                                                                                                                                                                                                                                             | 4 | 4 | OFF | OFF | OFF | OFF |
| 2                                                                                                                                                                                                                                                                             | 2 | 3 | OFF | ON  | OFF | ON  |
| 1                                                                                                                                                                                                                                                                             | 1 | 1 | ON  | ON  | OFF | OFF |
| ON = Open Circuit<br>OFF = Grounded Circuit<br><br>The NSBU Switch has only four positions available in the forward ranges. Therefore, one range position will be omitted at the selector. This position may be 2nd, 3rd, 4th or 5th range depending upon chosen calibration. |   |   |     |     |     |     |

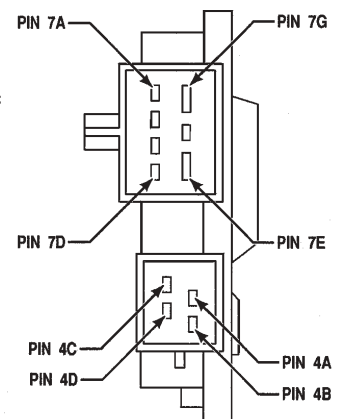
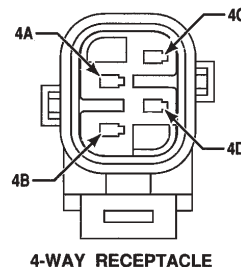
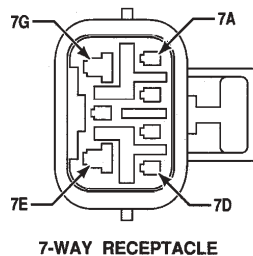
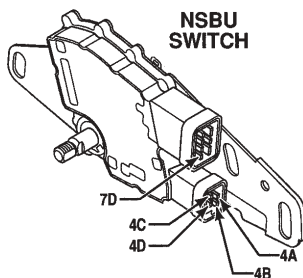
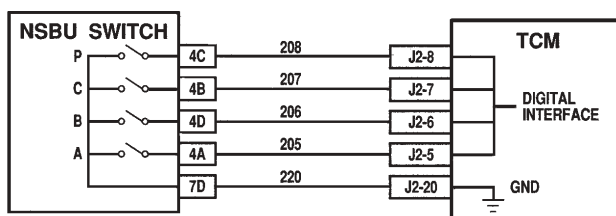
# *LCT 1000 RPO M74*

## *PRNDL Inoperative*

To separate switch concerns from the wiring and TCM, proceed as follows:  
Disconnect C1 and C2 connectors

1. Monitor the NSBU values with a scan tool.
2. Using jumper wires connect two wires at a time between the appropriate pin in connector C1 and pin D in connector C2 (with the key on). Leave the other two pins in connector C1 open. Alternate the pins as shown in the chart below. The PRNDL and the scan tool should show the range indicated in the chart.
3. If the proper range is indicated as the jumper sequence is varied, replace the switch. If the proper range is not indicated check the wiring before replacing the TCM.

ON= OPEN CIRCUIT  
OFF= GROUNDED CIRCUIT



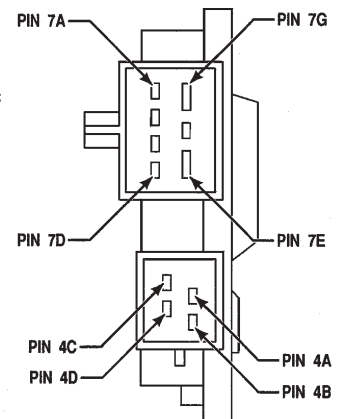
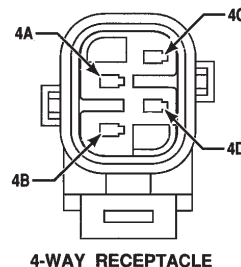
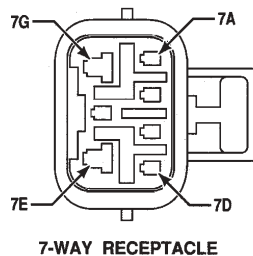
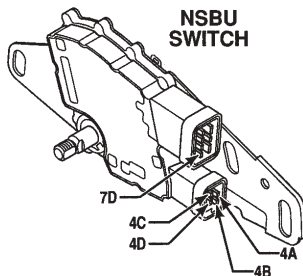
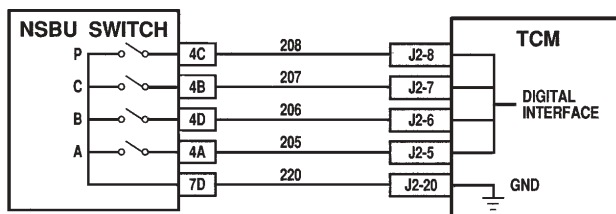
# *LCT 1000 RPO M74*

## *PRNDL Inoperative*

To separate switch concerns from the wiring and TCM, proceed as follows:  
Disconnect C1 and C2 connectors

1. Monitor the NSBU values with a scan tool.
2. Using jumper wires connect two wires at a time between the appropriate pin in connector C1 and pin D in connector C2 (with the key on). Leave the other two pins in connector C1 open. Alternate the pins as shown in the chart below. The PRNDL and the scan tool should show the range indicated in the chart.
3. If the proper range is indicated as the jumper sequence is varied, replace the switch. If the proper range is not indicated check the wiring before replacing the TCM.

ON= OPEN CIRCUIT  
OFF= GROUNDED CIRCUIT



# *LCT 1000*

## *Quicklearn Procedure*

The Allison LCT series transmission utilizes a quick learn (Also known as Fast learn) procedure designed to shorten the amount of time that it takes for the TCM adaptive-learning strategy to adjust for variations in clutch volume and apply time. By performing the quick learn functions, the amount of time that is required for TCM adaptive learning is reduced significantly. The Quick learn function requires a compatible fully functional scan tool. Quick learn should be performed if:

- Â The transmission was replaced/rebuilt or repaired
- Â The solenoids were replaced
- Â The TCM was replaced or recalibrated

Quick learn is accomplished in 4 parts, they are:

Â PARK MODE: With the vehicle in the park range the scan tool will repeatedly cycle the C3/C4 and C5 clutches on/off. This function will not only purge air from the system but it will also adjust for engagement time variation due to return spring load values, solenoid flow rates as well as seal/bushing leakage.

Â DRIVE: With vehicle in drive range the scan tool will cycle the C1 clutch to adjust for engagement time variation due to return spring load values, solenoid flow rates as well as seal/bushing leakage.

# *LCT 1000*

## *Quicklearn Procedure (continued)*

Â 3<sup>RD</sup>/4<sup>TH</sup> : Following the above procedures clutch volume for the C2 clutch requires the vehicle now be driven. To properly learn the C2 clutch volume the vehicle must complete at least three 3-4 shifts at steady throttle. This procedure does not require the use of a scan tool.

NOTE: If the scan tool harness becomes disconnected or if you lose communications with the TCM during the quick learn process, default actions may occur. If you were in Drive when the failure occurred, ranges other than drive may not be available. If you were in Reverse when the failure occurred, ranges other than reverse may not be available.

To perform a park/reverse/drive quick learn the following conditions must be met:

1. No DTCs are stored
2. NSBU is operating correctly
3. Speed sensors are operating correctly
4. TFT is between 104-212 F (40-100c)
5. Parking brake is set
6. Transfer case is in 2wd range
7. TP values are 0%
8. A compatible scan tool is being used

Now follow the instructions on the scan tool for the “FAST” (Quick) learn procedure.

NOTE: Block the wheels during the test procedures

# *LCT 1000 8.1L Engine*

## *Harsh Down Shifts, Harsh Garage Shifts*

Some customers may complain of the following symptoms:

- Â Harsh 3-2, 2-1 down shifts
- Â Harsh garage shifts
- Â Temperature Gauge reads low
- Â Drivability concerns, Possible Rich fuel trim DTCs may be set

The most common cause of this problem is related to the coolant temperature sensor reading. Generally, ECT DTC's will not be set.

Replace the ECT sensor

**Generally the ECT will read about 60°F (15c) with the vehicle at full operating temperature.**

